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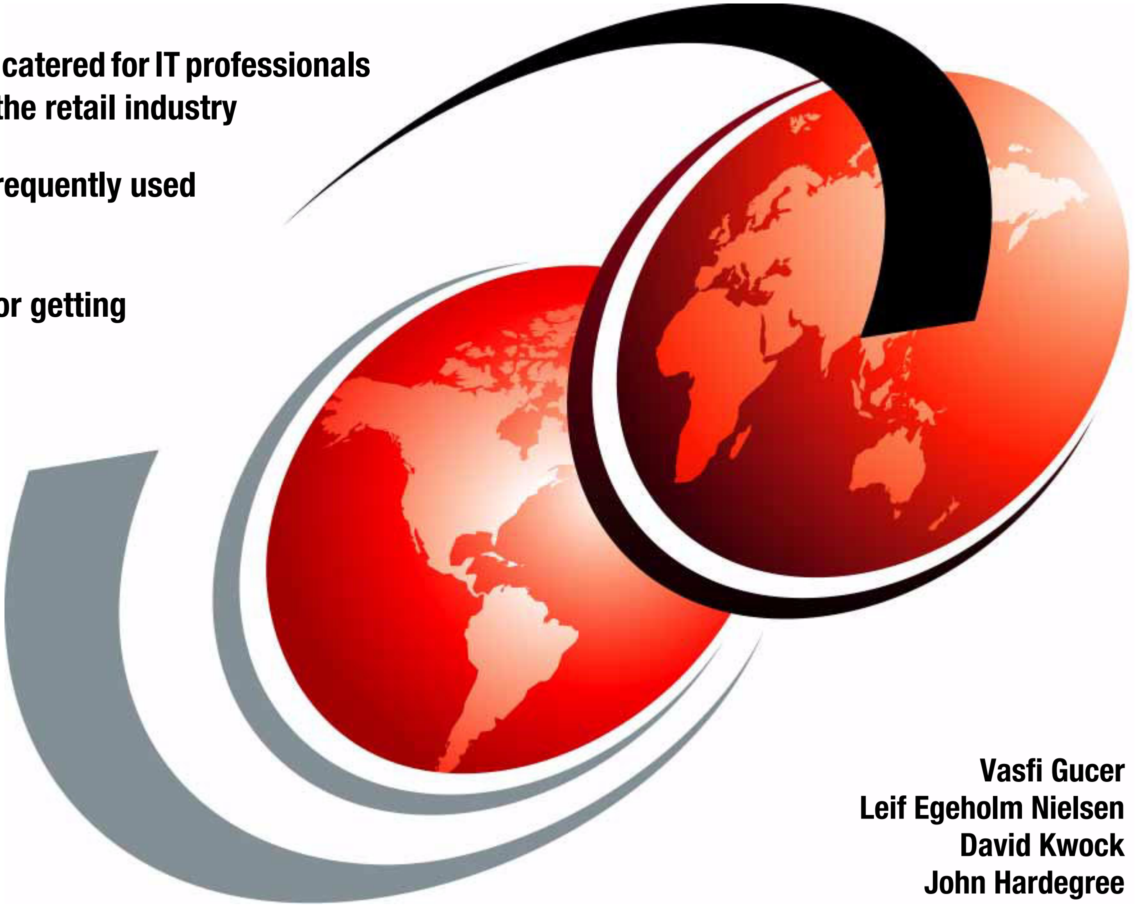
REDP-4372-00

Tivoli Provisioning Manager for OS Deployment in a Retail Environment

Specifically catered for IT professionals working in the retail industry

Describes frequently used scenarios

Cookbook for getting started



Vasfi Gucer
Leif Egeholm Nielsen
David Kwock
John Hardegree

Redpaper

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International Technical Support Organization

Tivoli Provisioning Manager for OS Deployment in a Retail Environment

January 2008

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Note: Before using this information and the product it supports, read the information in “Notices” on page vii.

First Edition (January 2008)

This edition applies to Tivoli Provisioning Manager for OS Deployment Version 5.1 Fixpack 3.

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Contents

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Preface

Retail environments, like many other industries, are continously seeking ways to reduce costs and improve their competitive advantages.

One area where cost reduction is at play is with the IT deployed in the warehouses. Because this environment is so distributed, significant cost savings can be achieved if the hardware and software can be maintained without having to be physically present in the warehouse.

This IBM® Redpaper presents the IBM Tivoli Provisioning Manager for OS Deployment software product as a solution to help customers reduce costs for deploying operating systems to point-of-sale devices in a highly distributed environment.

Additionally, the Redpaper introduces a solution specifically developed for IBM Technical Support, to reduce the recovery time whenever a software or hardware failure requires a system to be re-deployed.

The audience of the Redpaper are IT managers in the retail sector and technical support people in areas with point-of-sale or kiosk systems. Technical support people in other highly distributed environments may also benefit from the information herein.

The team that wrote this paper

This paper was produced by a team of specialists from around the world working at the International Technical Support Organization, Austin Center.

Vasfi Gucer is an IBM Certified Consultant IT Specialist at the ITSO Austin Center. He started his IBM career as a Network Specialist in 1989.. He has over 18 years of experience providing technical support across a variety of IBM products and technologies, including communications, network and systems management. For the last ten years Vasfi has been working for IBM ITSO, where he has been writing IBM Redbooks® and creating and teaching workshops around the world on a variety of topics. In this position, he has also worked on various Tivoli® customer projects as a Systems Architect and Consultant. He holds a Master's degree in Engineering.

Leif Egeholm Nielsen is a Certified IT Architect in Operations Architecture at IBM Denmark. He currently holds a position as account architect for the

Carlsberg account. He has 15 years of experience in the IT business and 10 years with Tivoli and Software Distribution. He holds a bachelor degree in mechanical engineering. Leifs areas of expertise include operational architectures, systems management, software distribution, and Tivoli software. Leif has previously participated in several ITSO residencies related to IBM Tivoli Inventory and Software Distribution products.

David Kwock is an IT Specialist in the United States. He has 7 years of experience in IT Service Management field. He has worked at IBM for 1 year. His areas of expertise include business automation, Service Oriented Architecture, System P and Linux®. He has written extensively on IT Service Management and Service Oriented Architecture. David has also spoken at IBM Executive Summits and Gartner conferences on the topics of IBM Service Management and Service Oriented Architecture.

John Hardegree is a senior IT Specialist working for IBM Global Services in the US. He has worked with Tivoli products since 1993 and was Tivoli Enterprise™ Certified in 1999. John holds a degree in A.S Degree in Electronics Technology and has over twenty years of experience in software/firmware design and systems management technical support. He spent almost four years with an IBM business partner as a Tivoli Professional Services consultant, has developed and taught several Tivoli courses and was the author of the TME10 List FAQ. He currently works on the midrange monitoring team for the State of Texas account.

Thanks to the following people for their contributions to this project:

Wade Wallace
International Technical Support Organization, Austin Center

Wayne Correa, Portfolio Manager, Retail Industry
IBM Global Services, North Carolina, USA

David H. Fritz
Global Technology Services
Technology and Business Integration, IBM Austin

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Introduction

This chapter introduces the retail environment, the technical challenges retail environments pose and how Tivoli Provisioning Manager for OS Deployment can be used to solve some of them.

This chapter also introduces realistic POS provisioning scenarios and outlines the environment used to produce this paper.

Readers already familiar with the retail environment may skip most of this chapter but for a full understanding of the scenarios it is recommended you read sections 1.7, “Typical scenarios in a system life cycle” on page 10 and 1.8, “Introducing the LAB environment” on page 13.

1.1 Target audience

This Redpaper is written specifically with IT people who work in the retail sector in mind. However, many of the topics and scenarios can easily be mapped to traditional workstation environments and therefore also be of benefit to IT professionals working with OS deployments outside the retail environments.

Since most of the content is technical in nature, a minimum of technical understanding is required. Experience with automated deployment of operating systems is highly recommended but not required. Understanding the principles involved in automated software distribution will be helpful.

Note: This Redpaper is based on Tivoli Provisioning Manager for OS Deployment V5.1 with Fixpack 3. Some of the screenshots may look slightly different from the ones in previous ITSO publications because of this.

1.1.1 Definition of roles and skills

Throughout the scenarios and examples the following defintions are used for different roles.

- POS user - or simply end user

  The POS user refers to the person using the POS system. For a cash register this will be the cashier, for self-checkout systems or kiosks this will be a customer. It is not assumed that the POS user will have any IT skills as such and normally this person will not be involved in any processes except experiencing a problem and notify someone of the problem.

- Local super user - or simply super user

  Every store, warehouse or super market should have at least one person to fulfill this role. The super user is not an IT professional, but has some understanding about the underlying IT and is capable of communicating with the IT professionals in helpdesk etc.

- Central IT

  Central IT refers the IT professionals located centrally at one location, physically distant from the production POS systems. There is no distinction in this Redpaper between IT professional at the helpdesk, server support, development etc.

- Field Technician

This role covers an external IT professional that is called in to a store to perform on-site repairs of systems. This include a service technician from IBM Technical Support.

1.2 The retail environment

The retail environment comprises every type of store, from the apparel store with one or two cash registers, to a large super market chain with thousands of stores each having a variety of cash registers, self-checkout lanes and kiosk systems for various purposes.

A typical IT environment for a department store is shown in Figure 1-1 on page 4.

The main application servers are located in a data center, most likely with a redundant setup, possibly even made site-redundant. This is the backend system for all transactions and will normally have interfaces to other systems used for logistics, finance, payroll, ordering and so forth.

In each warehouse is a local server that handles transactions from POS systems and forwards the transactions to the central server. This setup enables a warehouse to continue operation even if the network connections are interrupted for shorter periods of time. Typically, this server is also used for local customizations such as the text on the printed receipts, local discounts etc. Larger warehouses will probaly have this system setup in a redundant configuration. Even if the applications are configured to use the central server in case the local server is unavailable, there may be performance requirements that justify such setup.

Alone in the area of providing a high level of availability for the application servers required for purchase transactions lies several technical challenges. These are mainly part of the network, servers and applications and are not the scope of this Redpaper. Much of this information can be found from other sources, including the IBM Redbook *Enabling the On Demand Store with IBM Store Integration Framework*, SG24-6698.

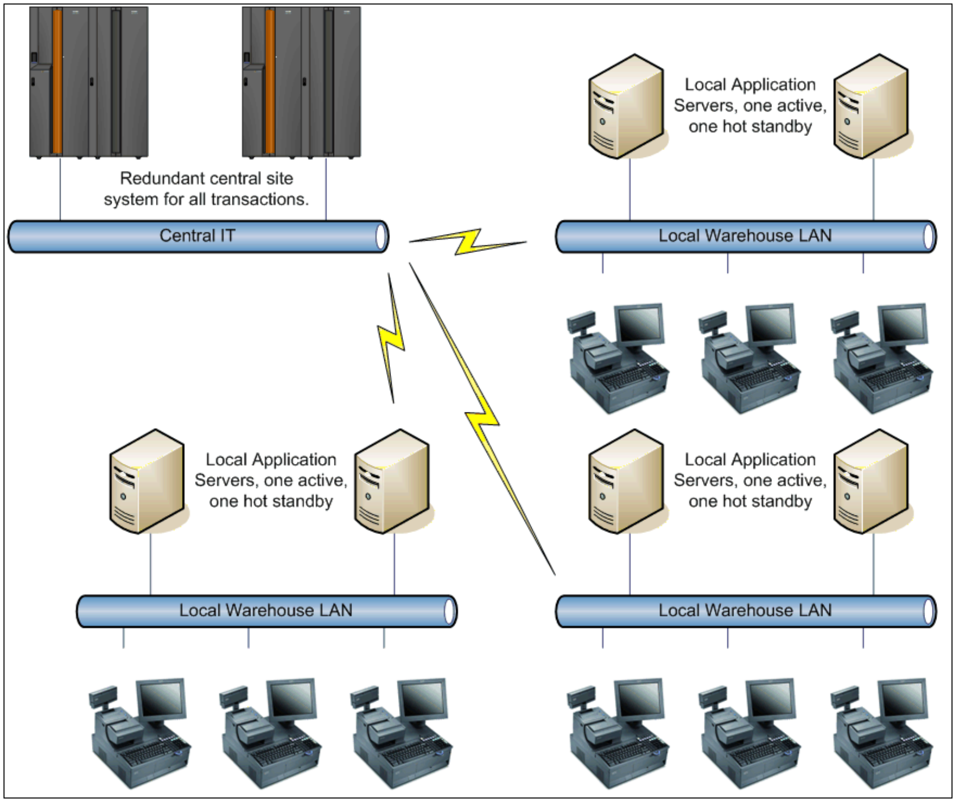


Figure 1-1 A typical IT environment for a department store

IBM POS systems are very much like standard Intel®-based workstations. There is a motherboard with an Intel x86 processor, memory, graphics adapter and network interface card. In addition there is also one or more USB interfaces. However, there are also some diferences: A POS system typically has several peripheral devices attached, including but not limited to;

- A keyboard, specifically designed for the point-of-sale system
- A touch screen
- A barcode scanner
- A scale
- A sensor (to verify the customer puts the item in the bag)
- A credit-card reader with signature type pad or pin code keyboard
- A cash-drawer
- A printer for receipts

These peripherals are connected via special connectors and via USB interfaces which may be carrying the standard 5 Volts or powered USB with 12 or 24 Volts.

The system typically runs only one application which is developed and/or tailored specifically to serve the purpose of the system. Under normal operation the end user will only use the application and not think about or have access to the underlying operating system.

By separating the point-of-sales systems from any traditional workstations in a store it is possible to limit the risk of infecting the point-of-sales systems with viruses, worms and other malware. The separation is done using VLANs, routers and/or firewalls depending on the required security level.

The retail environment is highly distributed, especially large retail chains, which may have one or more data centers and a significant number of stores distributed across the country or the world. The IT skills in a store is limited, resulting in a strong focus on standardization and on remote managability.

The typical lifetime of a point-of-sale system is five to seven years, which is somewhat more than a normal office workstation, be it a desktop or a notepad. During the lifetime of a point-of-sale system, the operating system is unlikely to change more than one or two times. Applications may be updated one or two times a year.

1.3 The role and importance of IT

For any store or warehouse, the point-of-sale system is essential for business. This is where goods are exchanged for money. Without the capability to handle these transactions automatically, a significant amount of back-office work is required and some parts of the transactions may not even be possible, such as payments by use of credit cards and printing out receipts.

It’s easy to visualize what happens if a store suddenly has a limited capability of processing sales: The remaining lanes will have growing queues, causing reduced customer satisfaction, and if the situation happens more than once in a quarter, some customers will probably place their business elsewhere.

For this reason, most larger warehouses have several layers of redundancy. First of all, there are usually more lanes than needed except for hollidays and seasonal occasions. Additionally, the network is typically kept isolated from networks used by regular workstations, and made redundant so half the POS systems are connected to one swtich and the other half to another. Application servers should also be set up for high availability, both with respect to independency in an individual store, and with the capability to fail over to a centrally located application server if the local application server fails. There are many wariations possible, however, they are not the topic for this Redpaper.

It is important to note that most larger warehouses have a surplus of POS systems which reduces the effects of one or a few systems being out of order. Smaller stores or restaurants are more likely to be affected, even if one system is out of order, since they may only have a total of two or three POS systems.

1.4 Operating systems on Point-of-sale devices

Not all operating systems are suitable for point-of-sales devices. A typical POS system has a lot of special devices that require drivers which are not widely available on all platforms. Also, the IT department may want to prevent the user from getting access to anything but the POS application which require an operating system with lockdown features.

The most common operating systems for point-of-sale systems include, but are not limited to:

- Microsoft® Windows® XP Professional
- Microsoft Windows 2000 Workstation
- WEPOS; Microsoft Windows Embedded for Point-of-services
- IRES; IBM Retail Environment for Suse Linux for POS

Different distributions of Linux also exist.

Older environments may also include systems running PC-DOS 2000.

For the scenarios used throughout this Redpaper we will only use Windows XP. For information about deploying Windows 2000 and Linux, please consult the IBM RedBook *Deployment Guide Series: Tivoli Provisioning Manager for OS Deployment V5.1*, SG24-7397.

1.5 Introducing Tivoli Provisioning Manager for OS Deployment

The IBM Tivoli software products that have previously provided capabilities for installation of operating systems on bare metal systems include NetView® Distribution Manager and Tivoli Configuration Manager. These products have been suceeded by the IBM Tivoli Provisioning Manager product which natively does not include similar features.

In 2006, IBM purchased a Swiss company called Rembo Technology SaRL. With this, IBM also acquired the Rembo software products to fill in this gap; Rembo Toolkit and Rembo Auto-Deploy.

The Rembo Toolkit was added to Tivoli Provisioning Manager v5.1 to provide native image management. The Rembo Auto-Deploy product was rebranded to Tivoli Provisioning Manager for OS Deployment.

Tivoli Provisioning Manager for OS Deployment is a software product that provides image management. It captures images of systems which have been prepared for mass-distribution, provides various ways of customizing and adjusting these images and provides a mechanism for distributing them to multiple systems.

During the distribution of an image, Tivoli Provisioning Manager for OS Deployment can identify the target system and automatically inject drivers that fits the particular system. A captured image can therefore be used for distribution to different hardware platforms. These processes are described in Figure 1-2 on page 8, which also clarifies some of the definitions used throughout the book:

- Unattended profile

  Profile is the term used for an element containing an operating system that can be deployed. An unattended profile means the operating system is based on the original installation files and the deployment will perform a true installation, going through all the steps a normal installation would, but using a script to automate all or most of the process.

- Cloning profile

  A profile is the term used for an element containing an operating system that can be deployed. A cloning profile means the operating system is based on an already installed system that has been prepared for mass distributions (cloning). For performance reasons this is the most often used method for mass distributions.

- Software Package

  This must not be confused with software packages as defined in other software distribution products such as IBM Tivoli Configuration Manager. In Tivoli Provisioning Manager for OS Deployment a software package can only be deployed as part of the deployment of an operating system in either an unattended or a cloning profile. A software package typically contains additional device drivers or files that need to be copied to the target, optionally executing a batch script or an executable file as part of it. Software packages can also be used to run unattended installations using MSI software packages.

- Deployment Schemes

The deployment of a profile can be customized using a deployment scheme. The default deployment scheme will be suficient for most deployments, but in some cases there may be reasons to adjust the deployment to optimize network bandwidth.

- Configuration

  Every profile has a configuration, which includes the attributes to apply when deploying the profile.

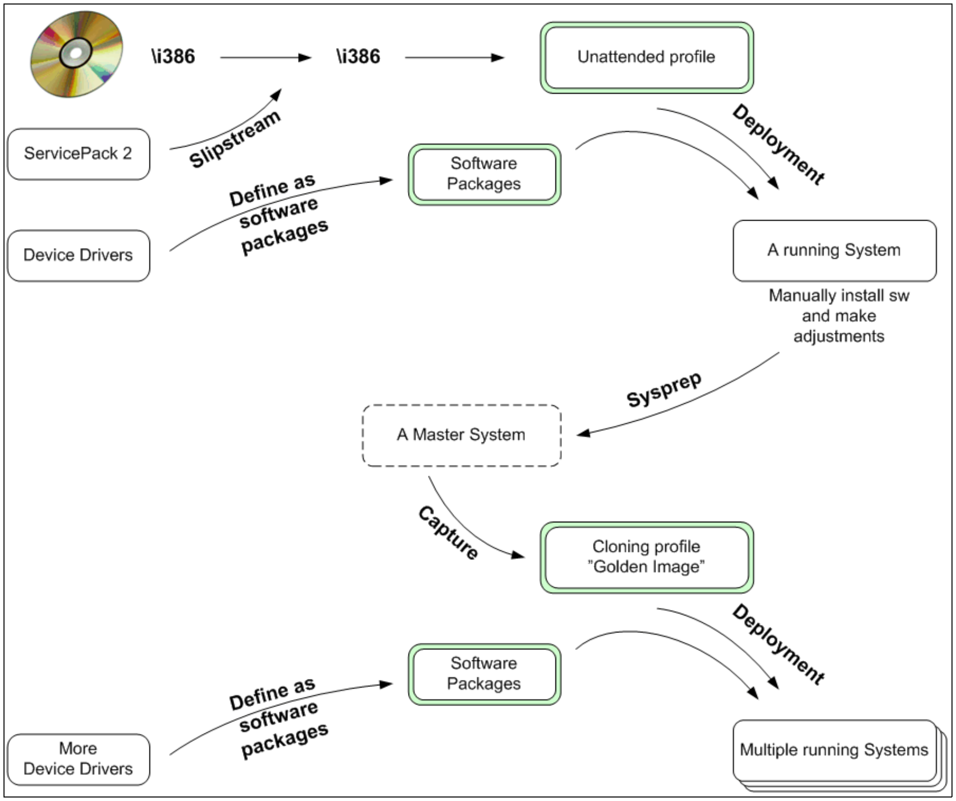


Figure 1-2 The main processes for a Windows XP mass distribution

1.6 Tivoli Provisioning Manager for OS Deployment in retail environments

From an architectural point of view, a point-of-sale system consist of different layers of software. This is illustrated in Figure 1-3 on page 9. With Tivoli

Provisioning Manager for OS Deployment it is possible to maintain the deployment and re-deployment of Operating System with suitable drivers, a Java™ Runtime environment and the applications to run directly on the operating system or on top of the Java Runtime environment. The applications should in this case be considered static, that is; the application will not during deployment receive any modifications to reflect the specific system it is installed to.

Data updated at regular intervals, including for example weekly or daily pricelists or special content to print on receipts, are not suitable for deployment via Tivoli Provisioning Manager for OS Deployment. This would require frequent, perhaps weekly updates to the image. Instead, this should be automated using other systems or scripts (which may be part of the static data that can be deployed using Tivoli Provisioning Manager for OS Deployment).

Realtime dynamic data consist mainly of transactions. For obvious reasons, these should never be of concern to a specific point-of-sale system. Transactions should always be handled by an enterprise application server with capabilities to perform roll back and roll forward, and preferably be based on a messaging system between POS systems and transaction servers.

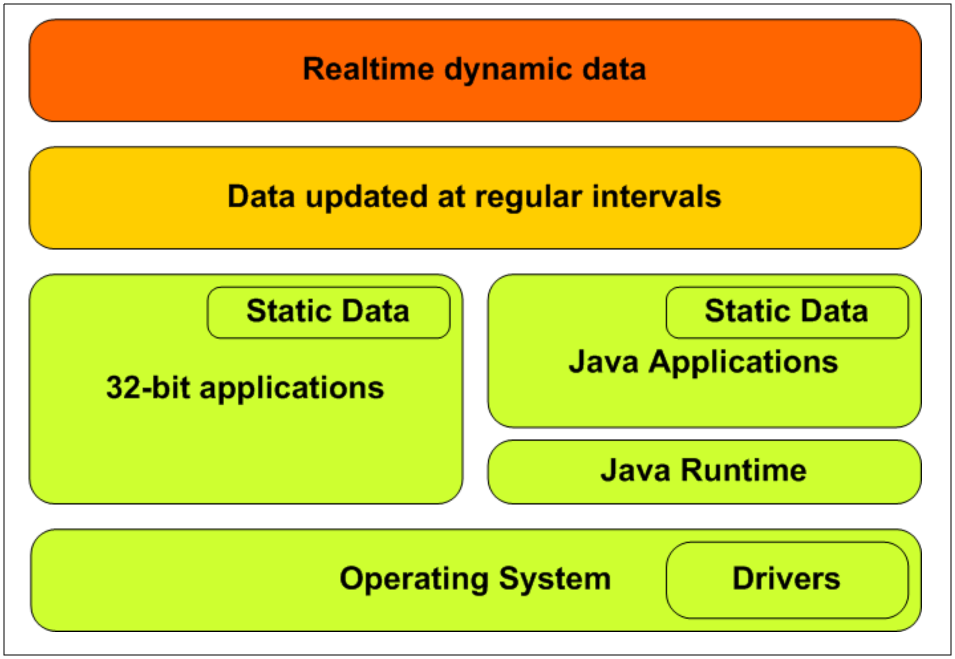


Figure 1-3 Software on a POS system from an architectural point of view

1.7 Typical scenarios in a system life cycle

Much has been written about the system life cycle. Figure 1-4 on page 10 shows some of the elements that are part of the system life cycle. Some of these elements can be supported using the Tivoli Provisioning Manager for OS Deployment product while others will require additional software, tools and processes.

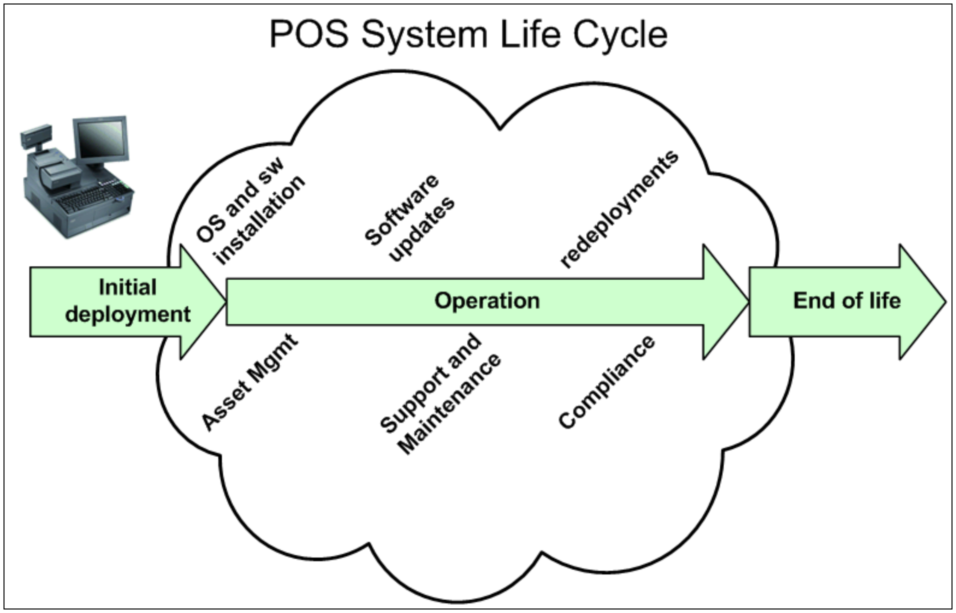


Figure 1-4 POS System Lifecycle

The remaining chapters of this paper will, through selected scenarios, show how the Tivoli Provisioning Manager for OS Deployment product can be used to accomodate the following system life cycle tasks that are carried out at regular intervals in any retail environment;

- First time installations using unattended installation
- Preparing a master image for mass distribution
- Deploying to multiple systems from a master image
- Re-deploying to a specific system to resolve a problem
- Backing up and restoring an entire system to resolve a problem

1.7.1 First-time installations

There are typically three situations where a first-time installation is required: One is when the initial environment is being established and another is when a solution already exists, but the current hardware is being replaced with new. These are commons situations in any IT environment and both cases can generally be managed in the same way. The third situation is when a new operating system is introduced, such as a change from Microsoft Windows to Linux, or an upgrade from Windows to Vista.

In a traditional IT department with PCs, the obvious approach may be to insert the CD with the operating system and proceed from there. However, there are some pitfalls with this method in the retail environment:

- Normally the point-of-service system does not have built-in floppy or CD-ROM drives. This can of course easily be fixed in the IT department via a USB-attached CD-ROM drive, but it does require some additional work.
- Some of the systems require specific hardware drivers to be installed during the operating system installation. This requires modifications of the default installation media or network drive.
- Without any additional automation method this approach will not be very practical with hundreds or thousands of POS systems in the production environment.

This is where Tivoli Provisioning Manager for OS Deployment comes at play. Adding a new hardware driver to an existing operating system is simply a matter of downloading the driver from the provider, unpack and create a software package with the drivers. Then the system is ready for initial deployment.

1.7.2 Preparing a system for use as a master image

Once a system has been prepared with the correct drivers and optionally had one or more applications installed and configured on it, it is ready to serve as a master image.

Before the system can be captured as an image, a final set af tasks must first be completed. For a Windows system this typically includes some cleanup and deletion of user-specific data, followed by a special utility called **`sysprep`**, which prepares the system for mass-distribution. The **`sysprep`** is the very last step to complete because it includes shutting down the system in a special state that is intended for mass distribution.

On Linux systems, there are similar cleanup activities but no special utilities to prepare the system for mass-distribution.

Once the installation has been prepared, the system must be booted from the network and connect to the Tivoli Provisioning Manager for OS Deployment server, From here, the installation can be used to create a new profile.

1.7.3 Deploying to multiple systems from a master image

Once the profile is on the Tivoli Provisioning Manager for OS Deployment server and necessary additional adjustments, scripts and drivers have been added, it is ready for deployment to other systems.

Without any further changes, the master image can be used for deployments to systems with same hardware. In order to distribute to systems with other hardware, it may be necessary to inject new drivers. This is done by defining software packages with the drivers and define bindings or rules for which drivers to inject on which systems.

1.7.4 Re-deploying to a specific system to resolve a problem

Normally if a software or hardware related problem occurs, the IT organization will attempt to troubleshoot and fix the problem. This can be a time consuming effort. The retail environment varys significantly from the traditional office environments where PCs are used for administrative tasks. Imagine a small super market or store with three or four cash registers. If one POS station is not available during busy hours, the line of customers could quickly grow, resulting in unhappy customers and eventually loss of business when disgruntled customers leave the store without making their purchases.

For the retail environment, it is therefore imperative that a failed system be brought back into operation as quickly as possible. Tivoli Provisioning Manager for OS Deployment provides several tools to assist in doing this, depending on the particular situation:

- If the failure is a local software error, the quickest way to get a system back online is a local redeployment. This feature requires that a copy of the installed image exist in a hidden partition on the hard drive, and that any local dynamic data can be automatically retrieved from a central server after redeployment.
- If the failure is the result of a malfunctioning hard drive, and a replacement drive is quickly installed, a new operating system can be deployed from a local Tivoli Provisioning Manager for OS Deployment server within 20-30 minutes. As in the previous case any dynamic data will need to be recovered or recreated after OS redeployment.

1.7.5 Backing up and restoring an entire system to resolve a problem

If the system contains dynamic data, a new POS plug-in utility for the Tivoli Provisioning Manager for OS Deployment product can be used to create image-backups of individual systems for faster restores. Obviously a restore can only recover the data that were included in the backup. If the dynamic data are weekly or daily price updates this should be managed by running daily backups.

The POS plug-in will be covered in Chapter 5, “System image snapshots” on page 95.

1.8 Introducing the LAB environment

In order to test realistic scenarios, a small environment has been established for the production of this Redpaper. The systems used throughout the scenarios are depicted in Figure 1-5 on page 13.

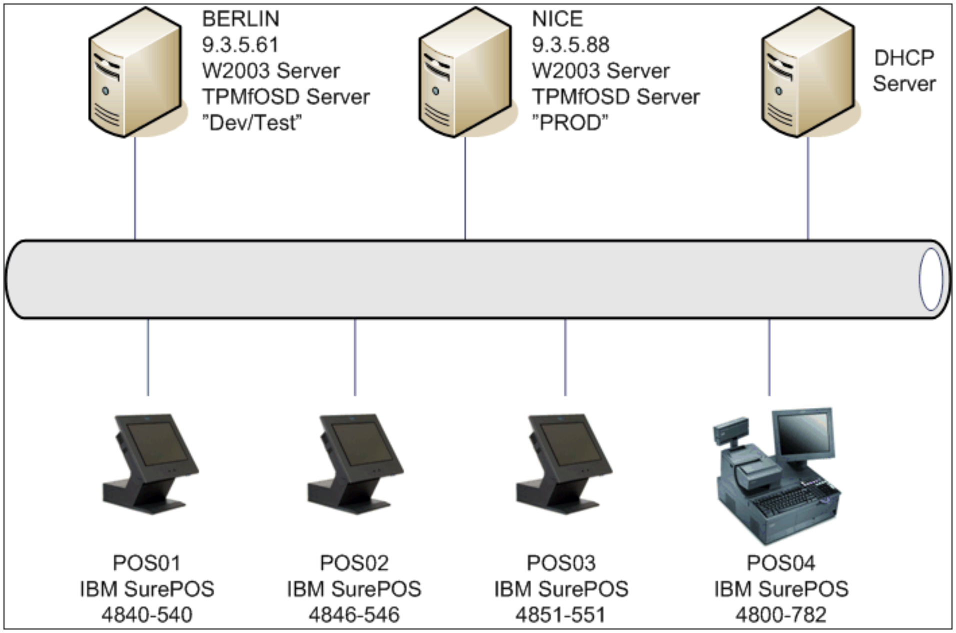


Figure 1-5 The LAB environment used for this Redpaper

The environment consist of two Intel based servers running Microsoft Windows 2003 Server and Tivoli Provisioning Manager for OS Deployment. One (BERLIN) represents a development and testing environment, while the other (NICE) is used to represent a production environment in a store. There is also an additiononal server (not shown) that provides DHCP services to our simulated environment.

Four types of POS devices exist in the simulated environment as well, each of which is a unique model, which helps to demonstrate Tivoli Provisioning Manager for OS Deployment’s capability of identifying different types of hardware and injecting the right drivers for each. In a large super market, for instance, it would not be unrealistic to have different types of hardware performing the same functions. The IT department would then typically have at least one of each hardware type.

The real-world IT environment that we are trying to simulate with the lab environment is depicted in Figure 1-6 on page 15.

Note that the environment does not include any application servers or other management systems. There would most likely be at least one application server in each warehouse, and several centrally located application servers in an actual enterprise, but management of these servers falls outside the scope of this paper. Likewise, there would normally be servers for systems management, such as monitoring and remote administration, but these are also outside our scope.

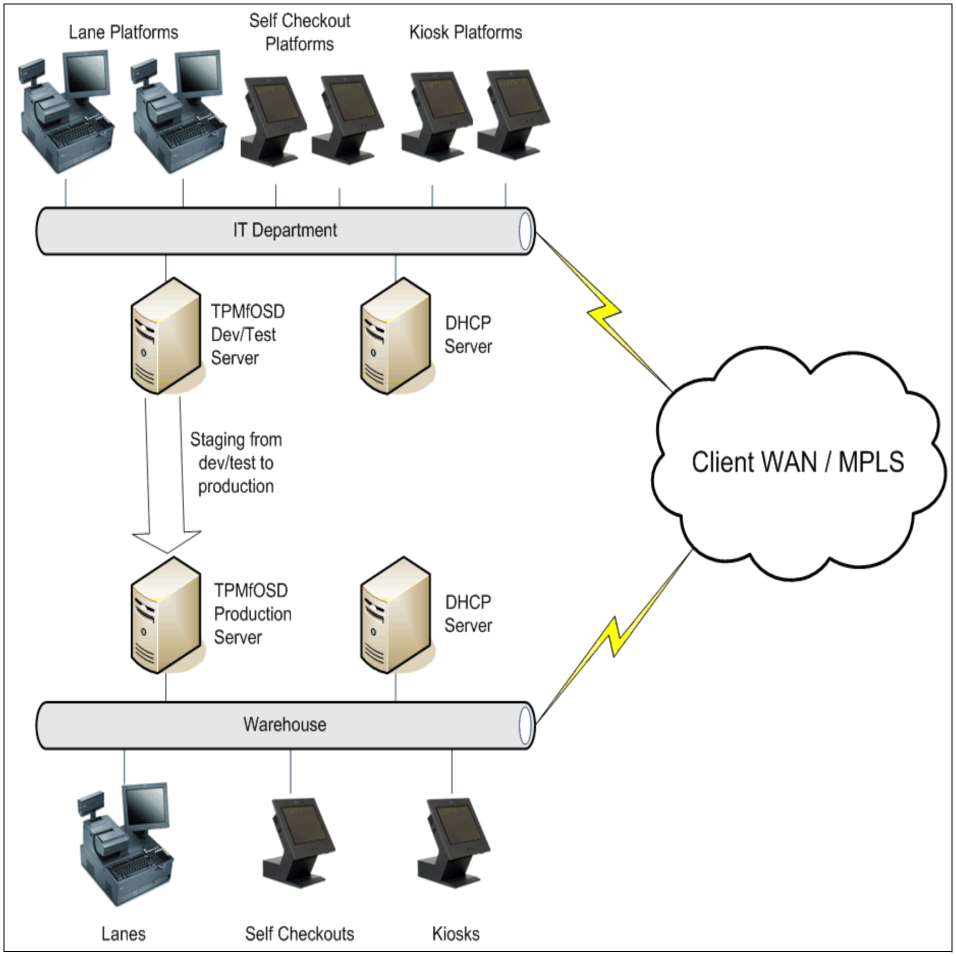


Figure 1-6 A real-world retail IT environment

2

First-time installations

In this chapter we discuss and describe how we install the Windows XP Professional operating system in the point-of-sale environment. We include step-by-step instructions for getting bare metal working for Windows XP systems.

We cover the case of a point-of-sale terminal build in a retail environment, where we may also have to consider special hardware configurations specific to the IBM SurePOS™ terminals.

This chapter has the following topics:

- Introduction
- Creating an unattended profile for Windows XP
- Creating software packages for drivers that need to be injected

2.1 Introduction

The first step is to choose what to deploy. With Tivoli Provisioning Manager for OS Deployment, you can either clone a machine or you can create an unattended setup profile. The former option copies the operating system together with the installed software from a source machine to a destination machine. The latter performs an automatic installation of an operating system as though you are at the machine with the installation CDs.

We start this chapter with the steps to perform an unattended installation of a Windows XP profile with some associated device drivers that will be deployed on a bare metal machine. This scenario is most likely the way a retail's IT organization would start their automated deployment of terminals unless they already had a template image suitable for cloning. Next, we describe the cloning process of a Windows XP machine and the customization process of the captured image to prepare for the mass deployment of the clone.

For both the unattended set up and the cloning deployments, we use Windows XP, Service Pack 2. In terms of Tivoli Provisioning Manager for OS Deployment we will do the following

- Create an unattended Windows XP installation profile using Windows XP SP2 installation CDs
- Clone a machine having the Windows XP operating system

For a target machine, we are using several different IBM SurePOS system types. They all meet the following minimum requirements listed below:

- PXE-compliant bootrom, version 2.00 or higher
- Minimal CPU: PentiumR type level
- Minimal RAM memory: 128 MB
- Video Electronics Standarts Association (VESA) release 2.0 or later, compliant Video BIOS to get high resolution (VGA fallback is always possible in case of incompatibility). However, Tivoli Provisioning Manager for OS Deployment can also work on machines without a monitor attached.
- Either a traditional Advanced Technology Attachment (ATA) drive with Ultra™ Direct Memory access (DMA) support if speed is required or any BIOS-supported hard drive.
- Desktop Management Interface (DMI) support for collecting hardware information, such as model and serial number.

The machines we used had at least 8 GB of diskspace since the Windows XP installation and the hidden partition used by Tivoli Provisioning Manager for OS

Deployment during the deploy may have problems with hard disk of lower capacity.

2.2 Creating an unattended profile for Windows XP

In this section we describe how to create a profile for unattended installation of Windows XP Professional with Service Pack 2 included. The major steps to create this profile includes:

- Copy the \i386 directory from the original installation media
- Download and slipstream the service pack
- Create the profile in Tivoli Provisioning Manager for OS Deployment

2.2.1 Copying the media files

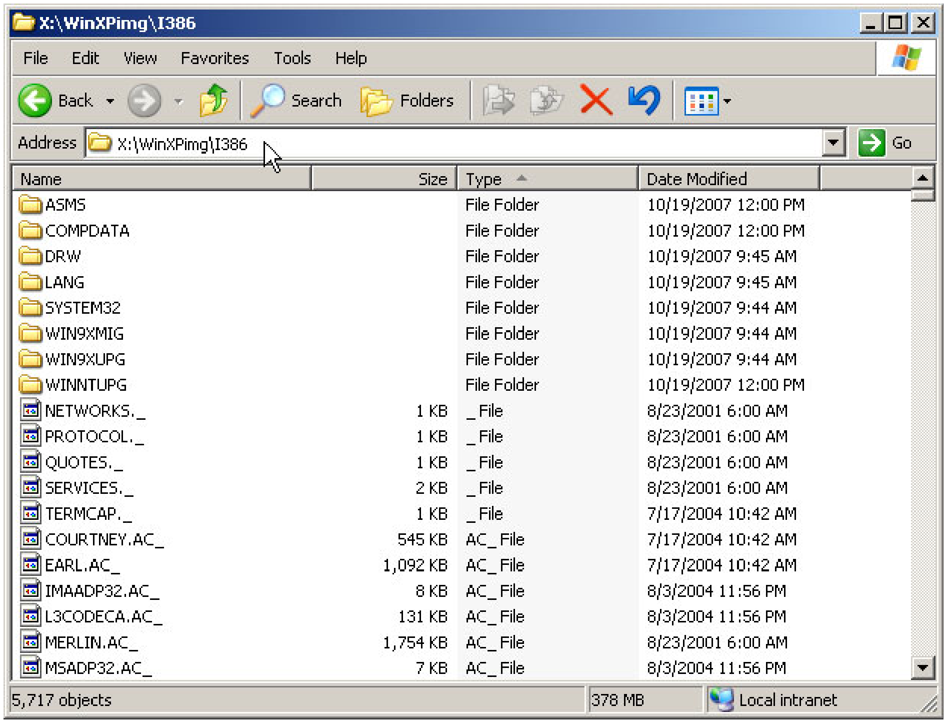
Copying the media files from the CD/DVD to a local disk allows us to customize the source depot for our installation of Windows XP. In our scenario we are using a Windows XP Professional CD for an Intel based 32-bit system.

1. Copy the full i386 folder from the CD-ROM drive including all system and hidden files as shown in Example 2-1. If you decide to copy using the GUI, make sure all hidden and system files are shown, otherwise thse fiels will not be copied.

   Example 2-1 Copying the Windows XP installation files to a local drive

   ```
   xcopy /E /H D:\i386 X:\WinXPimg\i386
   ```

2. Verify all files and folders are created in target folder as shown in Figure 2-1 on page 20.



Address X:\WinXPimg\I386

Name	Size	Type	Date Modified
ASMS		File Folder	10/19/2007 12:00 PM
COMPDATA		File Folder	10/19/2007 12:00 PM
DRW		File Folder	10/19/2007 9:45 AM
LANG		File Folder	10/19/2007 9:45 AM
SYSTEM32		File Folder	10/19/2007 9:44 AM
WIN9XMIG		File Folder	10/19/2007 9:44 AM
WIN9XUPG		File Folder	10/19/2007 9:44 AM
WINNTUPG		File Folder	10/19/2007 12:00 PM
NETWORKS._	1 KB	_ File	8/23/2001 6:00 AM
PROTOCOL._	1 KB	_ File	8/23/2001 6:00 AM
QUOTES._	1 KB	_ File	8/23/2001 6:00 AM
SERVICES._	2 KB	_ File	8/23/2001 6:00 AM
TERMCAP._	1 KB	_ File	7/17/2004 10:42 AM
COURTNEY.AC_	545 KB	AC_ File	7/17/2004 10:42 AM
EARL.AC_	1,092 KB	AC_ File	7/17/2004 10:42 AM
IMAADP32.AC_	8 KB	AC_ File	8/3/2004 11:56 PM
L3CODECA.AC_	131 KB	AC_ File	8/3/2004 11:56 PM
MERLIN.AC_	1,754 KB	AC_ File	8/23/2001 6:00 AM
MSADP32.AC_	7 KB	AC_ File	8/3/2004 11:56 PM

5,717 objects 378 MB Local intranet

Figure 2-1 Files sucessfully copied from CD-ROM to target destination

2.2.2 Slipstream Windows XP Service Pack 2

Slipstreaming a service pack, is the process of integrating the service pack into the installation so that with every new installation the operating system and service pack are installed at the same time. It not only has the advantage that when you install your operating system you don't have to apply the service pack, but also later, if you update any windows component, you will be sure that you get the correct installation files. This saves time for the installation process and saves space on the Tivoli Provisioning Manager for OS Deployment Server.

Follow these steps to integrate the Service Pack 2 into the Windows XP Professional image on the hard drive:

1. Download the full "Network Install" of the service pack and save it to a directory on your hard drive (in our example X:\winXPimg\SP2)

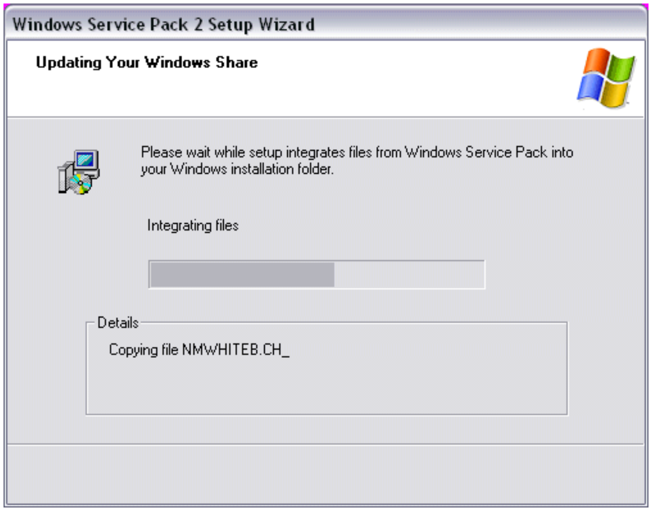
Note: Do not use spaces in the folder name.

2. Locate your local copy of the Windows XP source files that were created in 2.2.1, “Copying the media files” on page 19.
3. Open a command prompt (**start** → **run** → **cmd**) and go to the folder where you copied Service Pack 2. Type the command as shown in Example 2-2

Example 2-2 Unpacking and integrating Service Pack 2 into Windows XP

```
x:\winXPimg\SP2\WindowsXP-KB835935-SP2-ENU /integrate:X:\winXpimg\i386
```

After issuing the command above you should see the files being extracted and then integrated into the Windows XP files as shown in Figure 2-2


Windows Service Pack 2 Setup Wizard

Updating Your Windows Share

Please wait while setup integrates files from Windows Service Pack into your Windows installation folder.

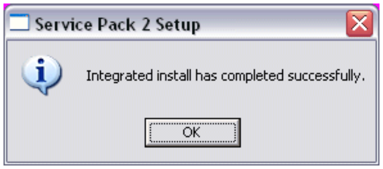
Integrating files

Details

Copying file NMWHITEB.CH_

Figure 2-2 Service Pack 2 unpack and integration in progress

After the extraction and integration is completed you should get a confirmation that Windows XP Service Pack2 has now been slipstreamed into your original Windows XP files as shown in Figure 2-3


Service Pack 2 Setup

Integrated install has completed successfully.

Figure 2-3 SP 2 integrated successfully

At this point the Service Pack 2 is integrated into the base code. This process is pretty much the same for all Windows operating system variants.

2.2.3 Creating the unattended profile

The main purpose of creating an unattended profile is to allow for a native installation of Windows XP to occur without replicating a pre-existing reference system. In our scenario, we assume there is no existing reference system to utilize. Therefore, we are building the system through the unattended profile process which will become the reference system for future installations which we can utilize for mass distribution.

We perform the following steps to create an unattended profile for Windows XP:

1. Log in to the console, select **OS Deployment** → **Profiles** → **Folders** → **System Profiles** → **Add a new profile**, as shown in Figure 2-4.

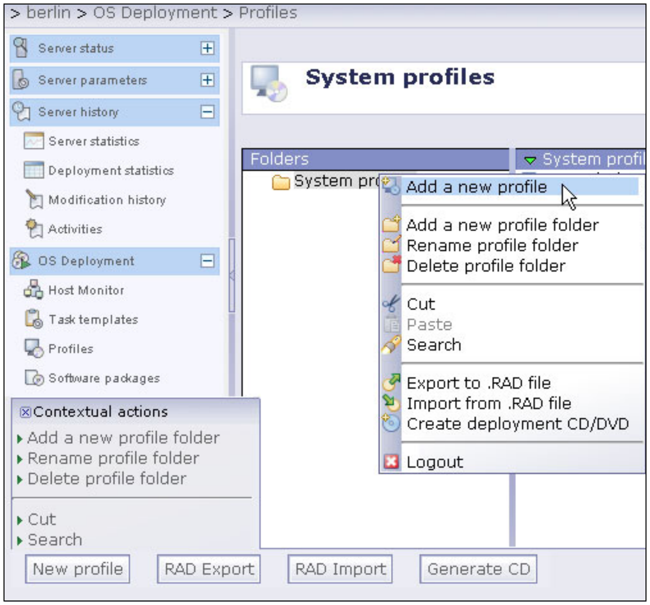
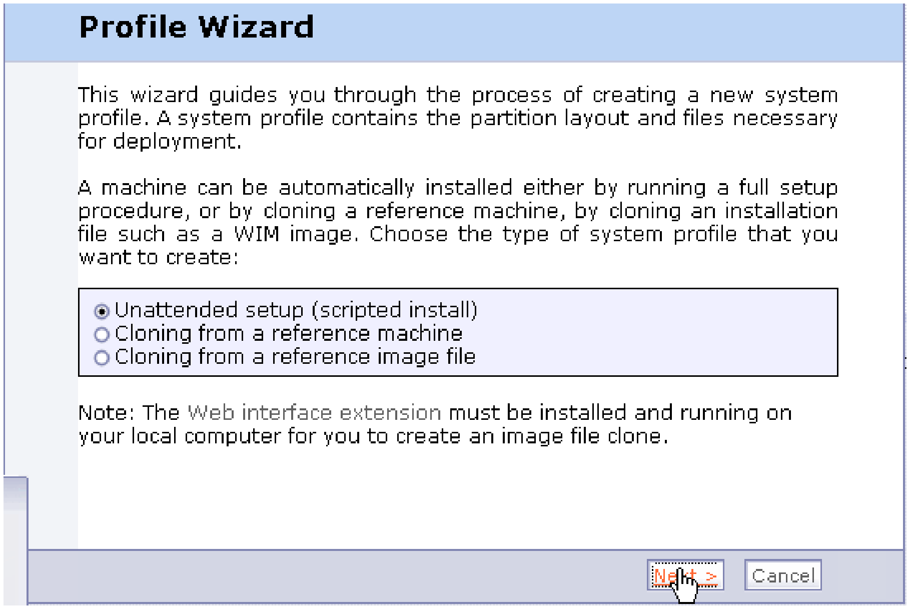


Figure 2-4 Launching the Profile Wizard

2. In the first profile wizard window, choose the **Unattended setup (scripted install)**, as shown in Figure 2-5 on page 23. This is because we want to install a new operating system using the installation CDs. Since one of the main purposes of Tivoli Provisioning Manager for OS Deployment is to make the installation process simpler and faster, the profile wizard will continue prompting the installation parameters in order to avoid the manual intervention on the client machine after the **deploy now** command is submitted. All the parameters that are needed to install an operation system on a bare metal machine are automatically validated to the process without any user intervention at a later time. Moreover, Tivoli Provisioning Manager

for OS Deployment allows users to modify these configuration parameters after the completion of the wizard. This is shown in the RedBook *Deployment Guide Series: Tivoli Provisioning Manager for OS Deployment V5.1*, SG24-7397 in section 4.3.1.



Profile Wizard

This wizard guides you through the process of creating a new system profile. A system profile contains the partition layout and files necessary for deployment.

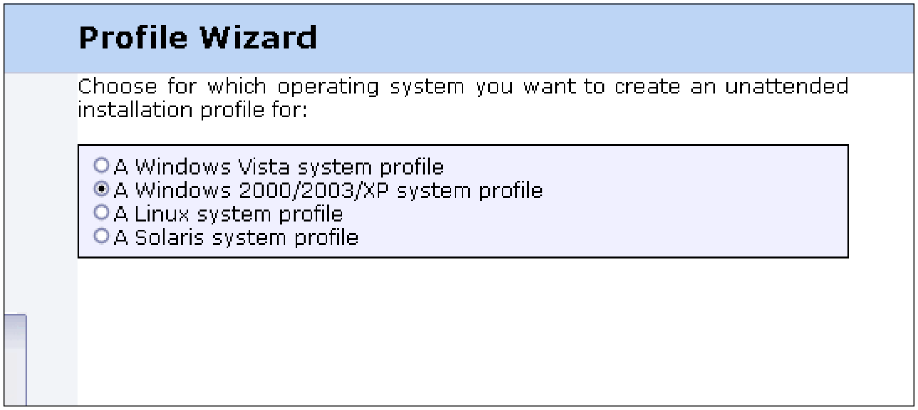
A machine can be automatically installed either by running a full setup procedure, or by cloning a reference machine, by cloning an installation file such as a WIM image. Choose the type of system profile that you want to create:

● Unattended setup (scripted install)
○ Cloning from a reference machine
○ Cloning from a reference image file

Note: The Web interface extension must be installed and running on your local computer for you to create an image file clone.

Figure 2-5 Selecting unattended installation

3. In the next profile wizard window it asks you the operating system that will be contained in the profile. In this case select “**A Windows 2000/2003/XP system profile**” option as shown in Figure 2-6



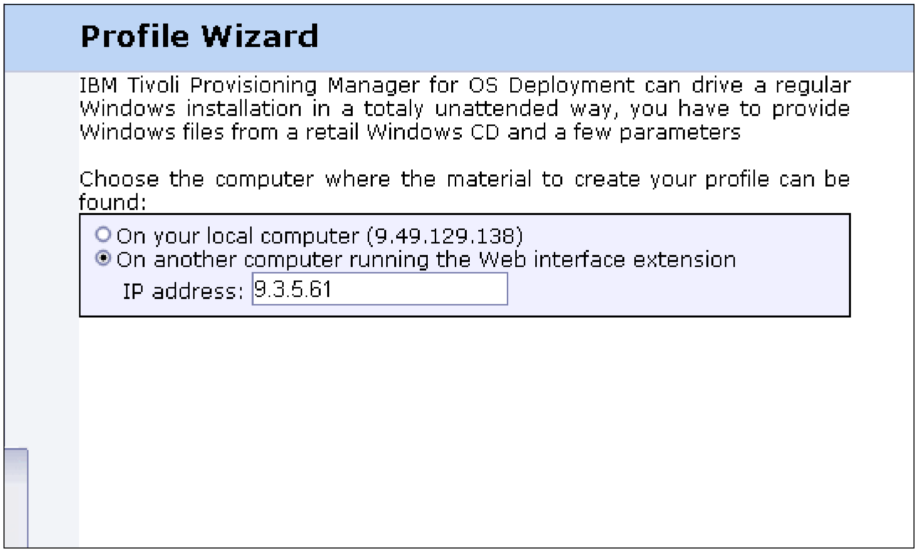
Profile Wizard

Choose for which operating system you want to create an unattended installation profile for:

○ A Windows Vista system profile
● A Windows 2000/2003/XP system profile
○ A Linux system profile
○ A Solaris system profile

Figure 2-6 Creating a Window XP profile

4. In order to select a location for the operating source files, it is required to either install the Web Interface extension, select a system that has the Web Interface extension, or import from the local import directory. This process is shown in Figure 2-7 on page 24.



Profile Wizard

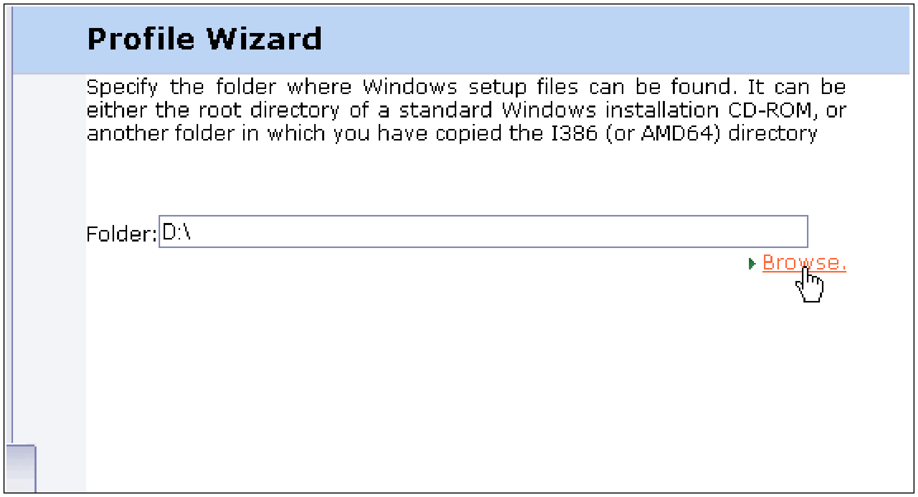
IBM Tivoli Provisioning Manager for OS Deployment can drive a regular Windows installation in a totaly unattended way, you have to provide Windows files from a retail Windows CD and a few parameters

Choose the computer where the material to create your profile can be found:

○ On your local computer (9.49.129.138)
● On another computer running the Web interface extension
IP address: 9.3.5.61

Figure 2-7 Connecting to the Web Extension

5. The next step is to specify where the installation files are located. Tivoli Provisioning Manager for OS Deployment will copy the installation files into its own system. This way they will be protected from outside changes, plus Tivoli Provisioning Manager for OS Deployment can optimize disk usage by keeping files only once across all images. Since we have the files on a local hard drive, we will click on the **browse** button, as shown in Figure 2-8.



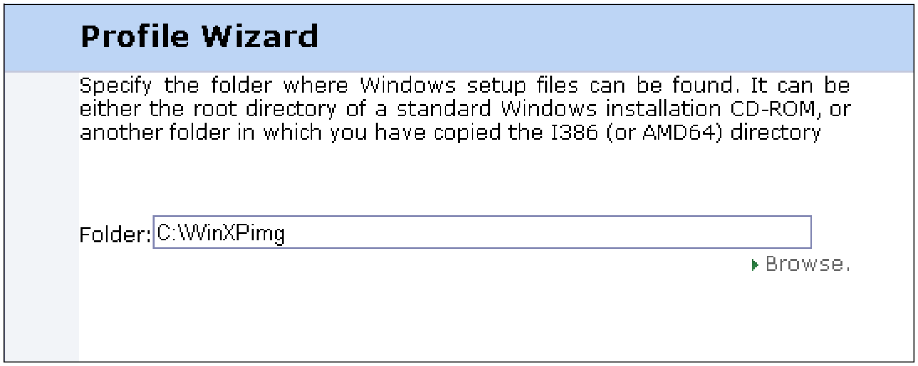
Profile Wizard

Specify the folder where Windows setup files can be found. It can be either the root directory of a standard Windows installation CD-ROM, or another folder in which you have copied the I386 (or AMD64) directory

Folder: D:\

Figure 2-8 Browse to source location

6. In our scenario we select the location where the files are located on the Tivoli Provisioning Manager for OS Deployment server as shown in Figure 2-9 on page 25.



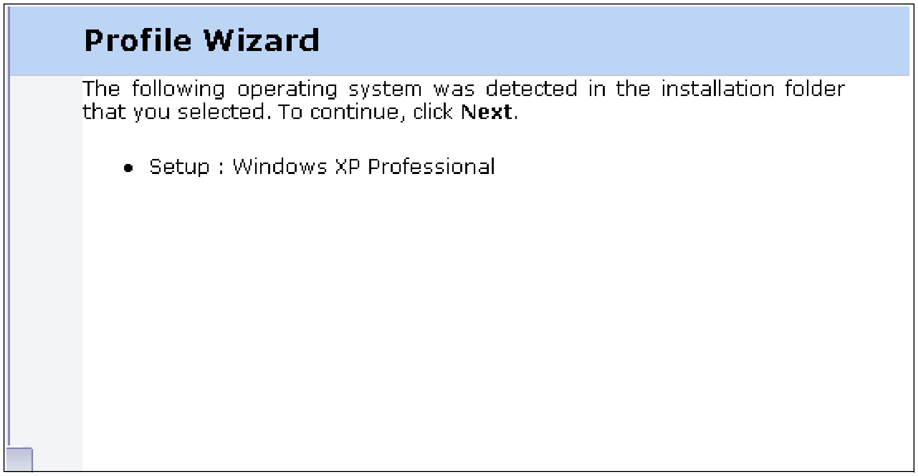
Profile Wizard

Specify the folder where Windows setup files can be found. It can be either the root directory of a standard Windows installation CD-ROM, or another folder in which you have copied the I386 (or AMD64) directory

Folder: C:\WinXPimg

Figure 2-9 Source File Location Specified

7. Next Tivoli Provisioning Manager validates the location that you specify as the source location and detects what installation software is available. In our scenario the profile wizard detects the correct Windows XP operating system and we select the **Next** button to move on to the next window in the profile wizard as shown in Figure 2-10.



Profile Wizard

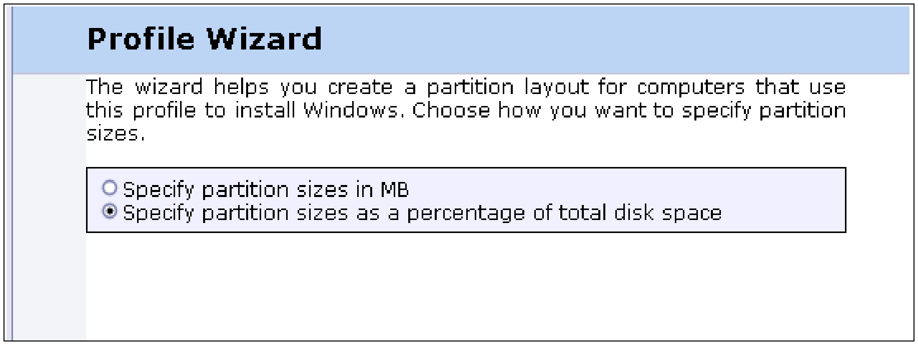
The following operating system was detected in the installation folder that you selected. To continue, click **Next**.

- Setup : Windows XP Professional

Figure 2-10 Operating system source files detected

8. Next we are prompted to define the partition size that will be used for the Windows XP installation. This can be defined as an absolute value or as a proportion of the available space. As you are unlikely to know the size of all target disks, we recommend that you specify to use 100% of the disk as shown in Figure 2-11 on page 26.

Tip: If you prefer to keep certain files on a system even after a redeployment of the operating system, create a second partition and place those files there.



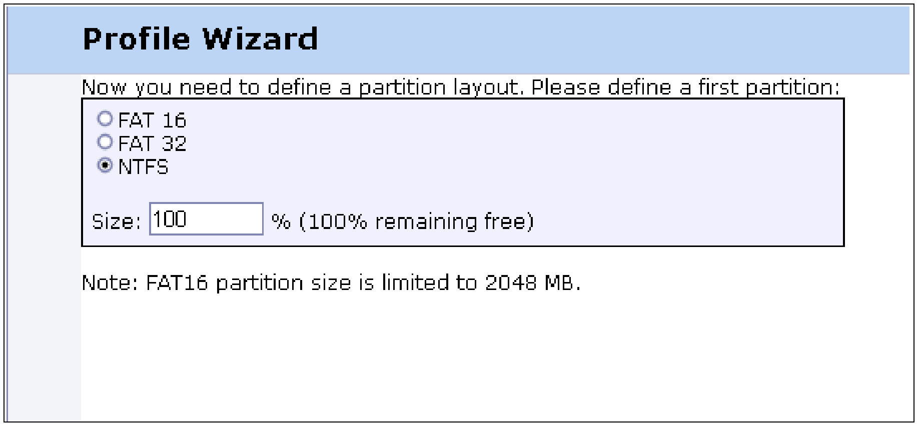
Profile Wizard

The wizard helps you create a partition layout for computers that use this profile to install Windows. Choose how you want to specify partition sizes.

○ Specify partition sizes in MB
● Specify partition sizes as a percentage of total disk space

Figure 2-11 Disk partition sizing question

9. Next we specify NTFS as the filesystem type and to use the entire disk as shown in Figure 2-12



Profile Wizard

Now you need to define a partition layout. Please define a first partition:

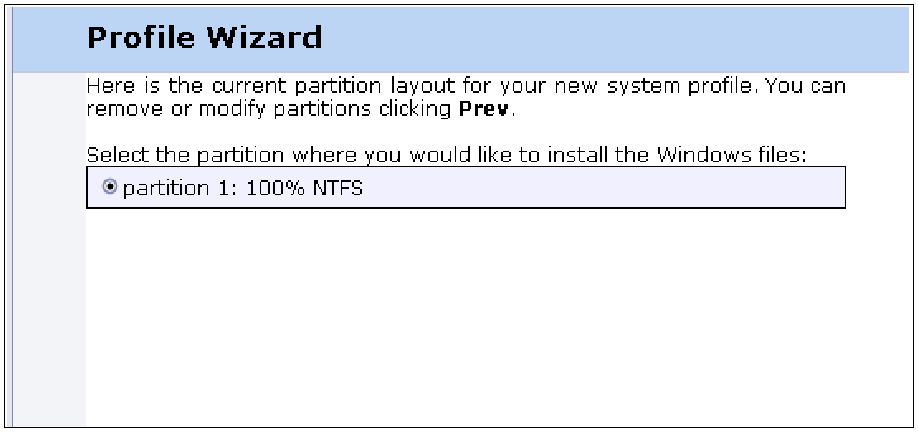
○ FAT 16
○ FAT 32
● NTFS

Size: 100 % (100% remaining free)

Note: FAT16 partition size is limited to 2048 MB.

Figure 2-12 Specify filesystem type and size in percentage format

10. Next we confirm that we have defined one NTFS partition using 100% of the disk as shown in Figure 2-13 on page 27.



Profile Wizard

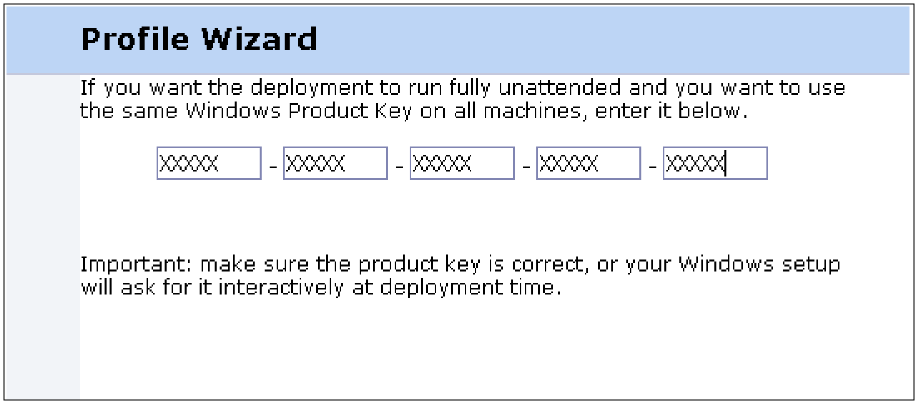
Here is the current partition layout for your new system profile. You can remove or modify partitions clicking **Prev**.

Select the partition where you would like to install the Windows files:

● partition 1: 100% NTFS

Figure 2-13 Confirm fileystem size and format

11. In order for Tivoli Provisioning Manager for OS Deployment to install unattended we must specify the product key for the unattended installation as shown in Figure 2-14.



Profile Wizard

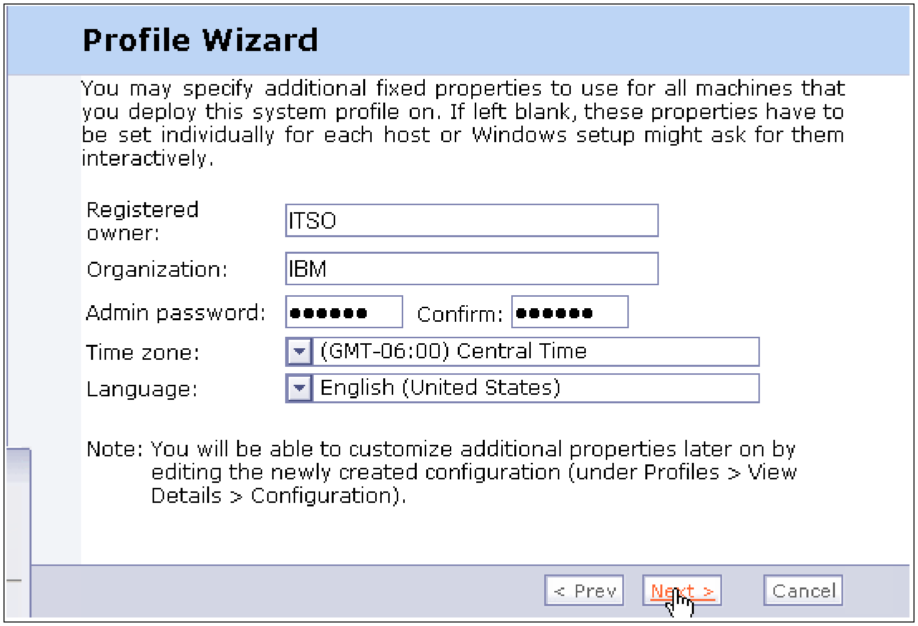
If you want the deployment to run fully unattended and you want to use the same Windows Product Key on all machines, enter it below.

XXXXX - XXXXX - XXXXX - XXXXX - XXXXX

Important: make sure the product key is correct, or your Windows setup will ask for it interactively at deployment time.

Figure 2-14 Input product key

12.Next we specify additional fixed properties to use for all machines that you deploy this system profile on. If left blank, these properties have to be set individtually for each host or Windows setup might ask for them interactively. In this case we set the fixed properties as shown in Figure 2-15 on page 28.



Profile Wizard

You may specify additional fixed properties to use for all machines that you deploy this system profile on. If left blank, these properties have to be set individually for each host or Windows setup might ask for them interactively.

Registered owner: ITSO

Organization: IBM

Admin password: ●●●●●● Confirm: ●●●●●●

Time zone: (GMT-06:00) Central Time

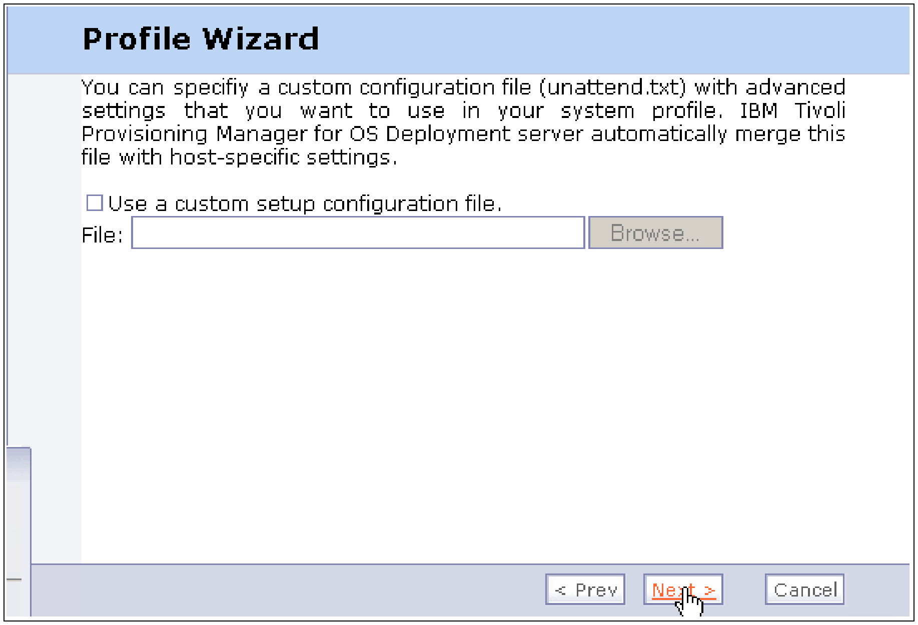
Language: English (United States)

Note: You will be able to customize additional properties later on by editing the newly created configuration (under Profiles > View Details > Configuration).

Figure 2-15 setting fixed properties

13. Next we specify a custom unattended.txt for advanced settings that you want to use in your system profile. We leave this blank in our unattended installation as shown in Figure 2-16.

    For information about the unattended.txt file consult the help file ref.chm which is included in the Windows XP Deployment tools. A link is provided in , “Online resources” on page 142.



Profile Wizard

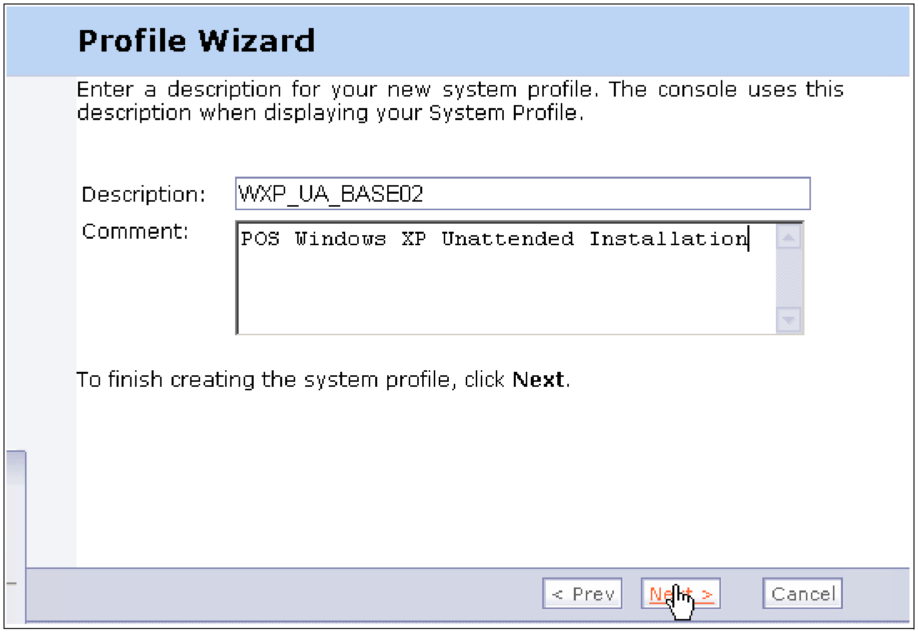
You can specifiy a custom configuration file (unattend.txt) with advanced settings that you want to use in your system profile. IBM Tivoli Provisioning Manager for OS Deployment server automatically merge this file with host-specific settings.

☐ Use a custom setup configuration file.

File:

Figure 2-16 Specifying unattend.txt file or advanced settings

14. Next enter a descriptive name and relevant comments as shown in Figure 2-17 on page 30. Note that only the name will be shown when chossing the profile during deployments, so make sure it is descriptive.



Profile Wizard

Enter a description for your new system profile. The console uses this description when displaying your System Profile.

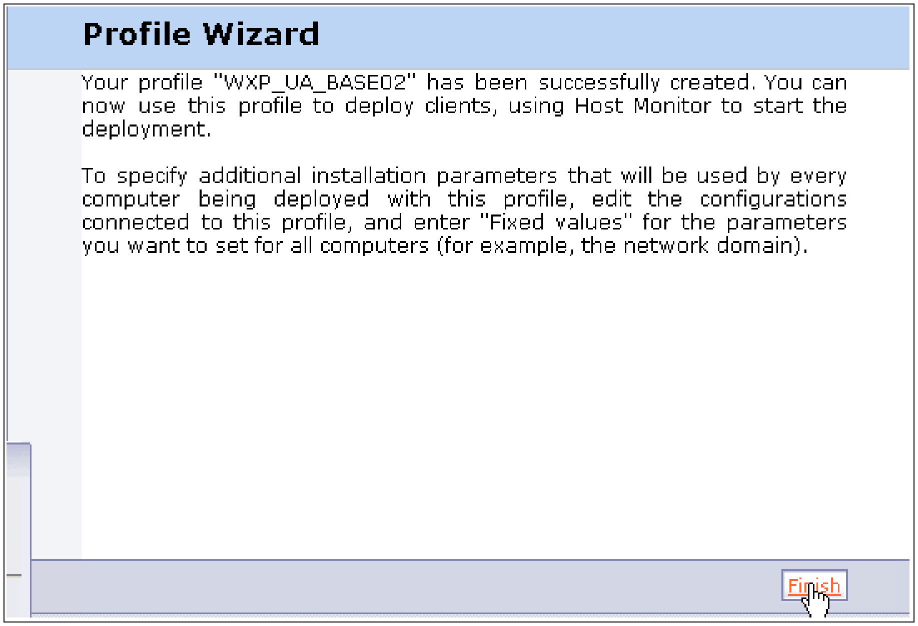
Description: WXP_UA_BASE02

Comment: POS Windows XP Unattended Installation

To finish creating the system profile, click **Next**.

Figure 2-17 Entering name and comments for the profile

15. Finally, we confirm the creation of the profile and finish the profile creation as shown in Figure 2-18.



Profile Wizard

Your profile "WXP_UA_BASE02" has been successfully created. You can now use this profile to deploy clients, using Host Monitor to start the deployment.

To specify additional installation parameters that will be used by every computer being deployed with this profile, edit the configurations connected to this profile, and enter "Fixed values" for the parameters you want to set for all computers (for example, the network domain).

Figure 2-18 Finishing the unattended profile creation wizard

The above steps has now resulted in a profile for an unattended installation of Windows XP professional with Service Pack 2 integrated.

2.3 Adding drivers

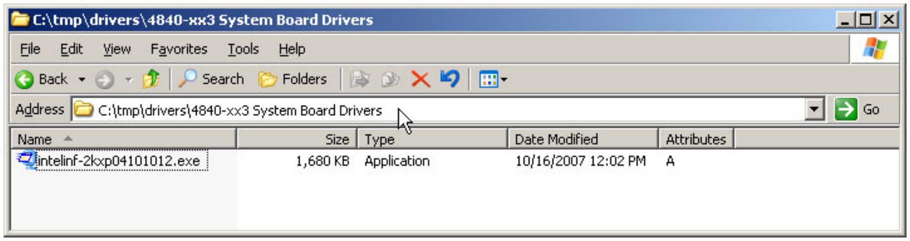
In the point-of-sale environment the chances of having different types of hardware to deploy to is very high. In our case we had four different types of SurePOS systems, each requiring a different set of drivers. We found that it was critical to inject the proper system board drivers at a minimum during the installation process in order for the system to be usable after installation. This section will go through the process of importing a driver into the TPM for OS Deployment file repository and associating it with the proper type of device.

Note: This procedure works only for PnP drivers. If you want to make an image with additional Mass-storage drivers then there is a Technote documenting the procedure. To find the Technote, search the Tivoli support site for incident 1260552.

2.3.1 Downloading and unpacking the drivers

Drivers are prepared in Tivoli Provisioning Manager for OS Deployment as software packages. The following steps show how a system board driver for a SurePOS system is downloaded, unpacked and created as a device driver software package that can be used during deployments.

1. First, download the appropriate driver file from the relevant web site. The latest device drivers for IBM SurePOS systems can be found at `http://www2.clearlake.ibm.com/store/support`. In our case we are creating a driver package for the system board driver for the IBM SurePOS System type 4840-553. which are in the file intelinf-2kxp04101012.exe as shown in Figure 2-19.



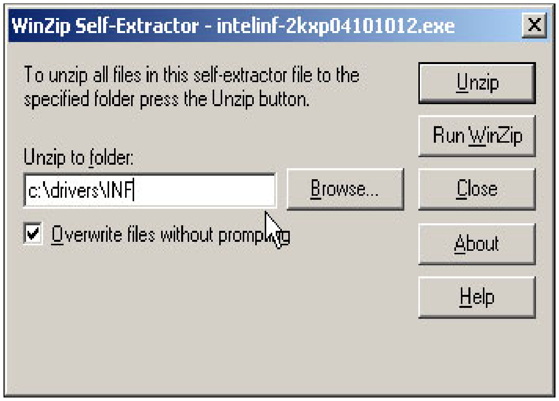
C:\tmp\drivers\4840-xx3 System Board Drivers

Address: C:\tmp\drivers\4840-xx3 System Board Drivers

Name	Size	Type	Date Modified	Attributes
intelinf-2kxp04101012.exe	1,680 KB	Application	10/16/2007 12:02 PM	A

Figure 2-19 System board driver package

2. Next, we run the executable for system board driver and select an extract location for the files and click the Unzip button as shown in Figure 2-20 on page 32.



WinZip Self-Extractor - intelinf-2kxp04101012.exe

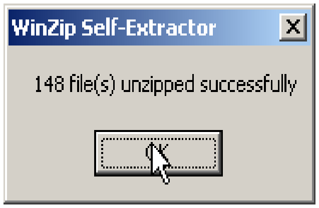
To unzip all files in this self-extractor file to the specified folder press the Unzip button.

Unzip to folder: c:\drivers\INF

☑ Overwrite files without prompting

Figure 2-20 Select Extract location for driver package

3. After the extract of the system driver completes sucessfully click the OK button to confirm the completion of the extract as shown in Figure 2-21.



WinZip Self-Extractor

148 file(s) unzipped successfully

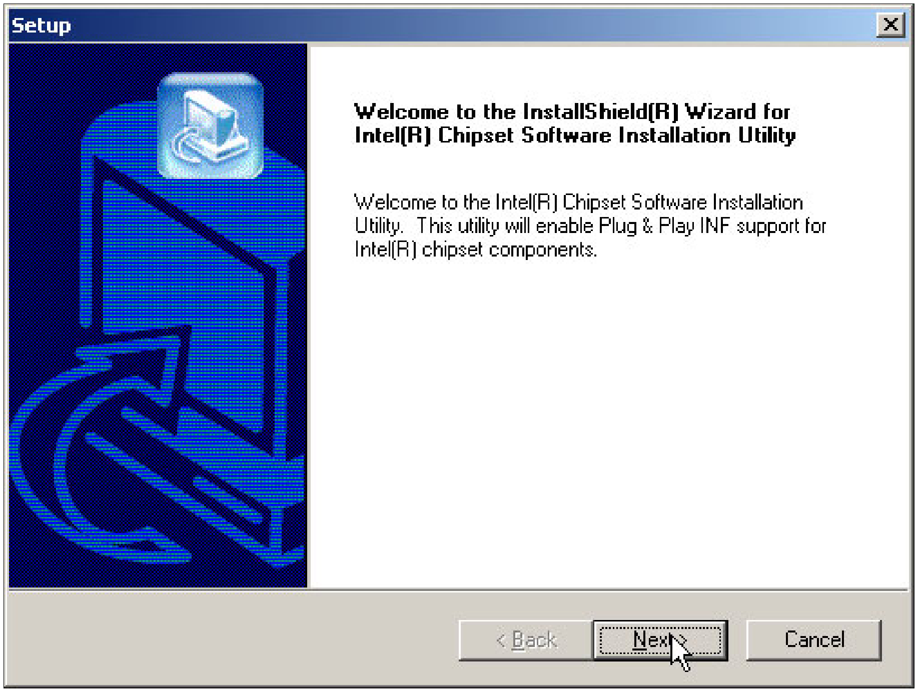
Figure 2-21 Drivers unpacked

4. Next go to a command prompt and extract the *.inf files for the system board drivers by running the command as shown in Example 2-3. The actual unpacking varies from one driver to the other so always consult the documentation or readme textfile.

Example 2-3 Extracting the drivers

```
c:\drivers\inf>setup -A -A -P c:\tmp\driverExtract
```

5. The setup utility is launched as shown in Figure 2-22 on page 33.



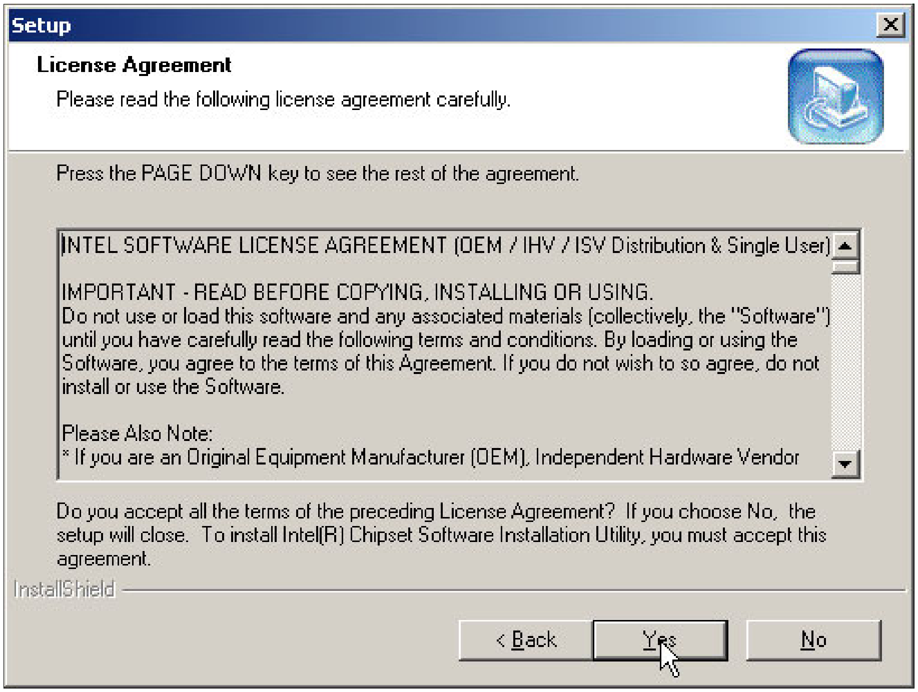
Setup

Welcome to the InstallShield(R) Wizard for Intel(R) Chipset Software Installation Utility

Welcome to the Intel(R) Chipset Software Installation Utility. This utility will enable Plug & Play INF support for Intel(R) chipset components.

Figure 2-22 Driver setup wizard is launched

6. Next Accept the license agreement as shown in Figure 2-23.



License Agreement

Please read the following license agreement carefully.

Press the PAGE DOWN key to see the rest of the agreement.

INTEL SOFTWARE LICENSE AGREEMENT (OEM / IHV / ISV Distribution & Single User)

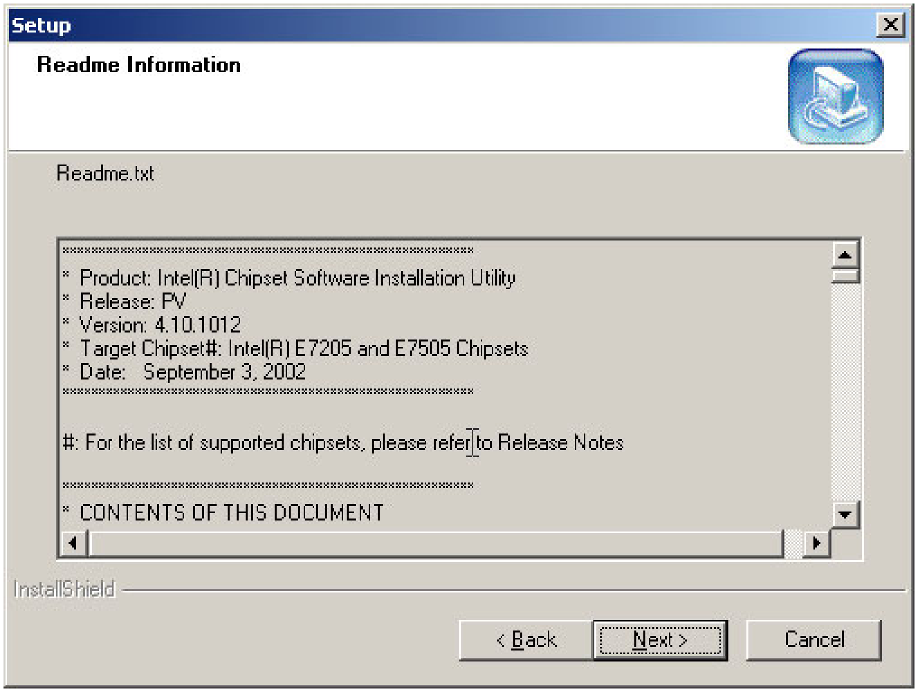
IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING.
Do not use or load this software and any associated materials (collectively, the "Software") until you have carefully read the following terms and conditions. By loading or using the Software, you agree to the terms of this Agreement. If you do not wish to so agree, do not install or use the Software.

Please Also Note:
* If you are an Original Equipment Manufacturer (OEM), Independent Hardware Vendor

Do you accept all the terms of the preceding License Agreement? If you choose No, the setup will close. To install Intel(R) Chipset Software Installation Utility, you must accept this agreement.

Figure 2-23 Accepting the license agreement

7. The Readme Information will be displayed. Click the **Next** button as shown in Figure 2-24 on page 35.



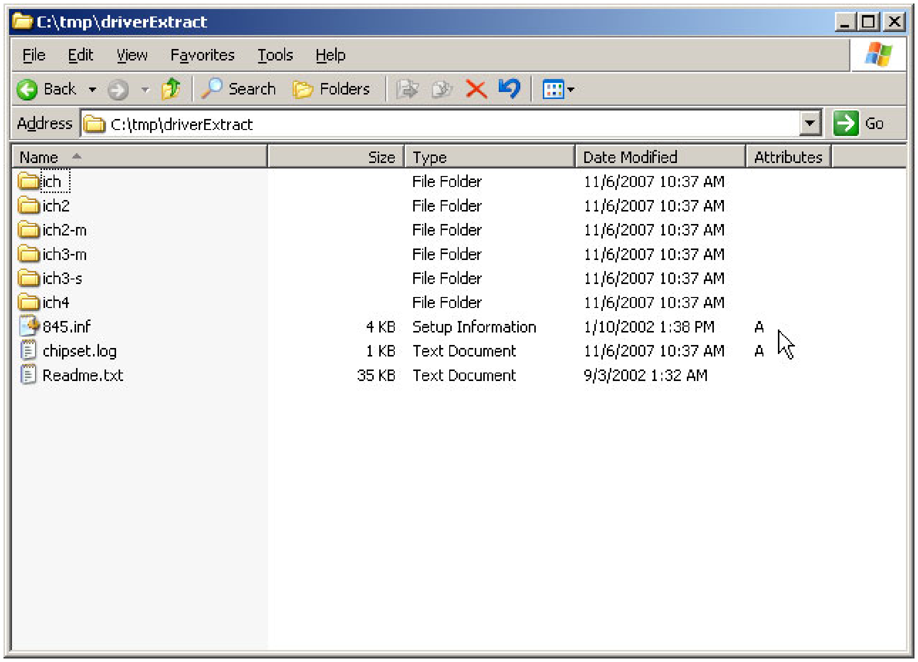
```
**************************************************************
* Product: Intel(R) Chipset Software Installation Utility
* Release: PV
* Version: 4.10.1012
* Target Chipset#: Intel(R) E7205 and E7505 Chipsets
* Date:   September 3, 2002
**************************************************************

#: For the list of supported chipsets, please refer to Release Notes

**************************************************************
* CONTENTS OF THIS DOCUMENT
```

Figure 2-24 Review Readme Information

8. Verify that the files were extracted to the destination location as shown in Figure 2-25.



Address C:\tmp\driverExtract

Name	Size	Type	Date Modified	Attributes
ich		File Folder	11/6/2007 10:37 AM	
ich2		File Folder	11/6/2007 10:37 AM	
ich2-m		File Folder	11/6/2007 10:37 AM	
ich3-m		File Folder	11/6/2007 10:37 AM	
ich3-s		File Folder	11/6/2007 10:37 AM	
ich4		File Folder	11/6/2007 10:37 AM	
845.inf	4 KB	Setup Information	1/10/2002 1:38 PM	A
chipset.log	1 KB	Text Document	11/6/2007 10:37 AM	A
Readme.txt	35 KB	Text Document	9/3/2002 1:32 AM	

Figure 2-25 Display the extracted inf files

2.3.2 Creating a software package for device drivers

Once the inf files for the driver are exposed through a process as shown in 2.3.1, “Downloading and unpacking the drivers” on page 32, the drivers can be packaged in Tivoli Provisioning Manager for OS Deployment. In order to package the driver follow the steps listed below:

1. Login to the Tivoli Provisioning Manager for OS Deployment console and go to **OS Deployment** → **Software Packages**, and click the “**Add a New Software package**” button on the bottom left as shown in Figure 2-26.

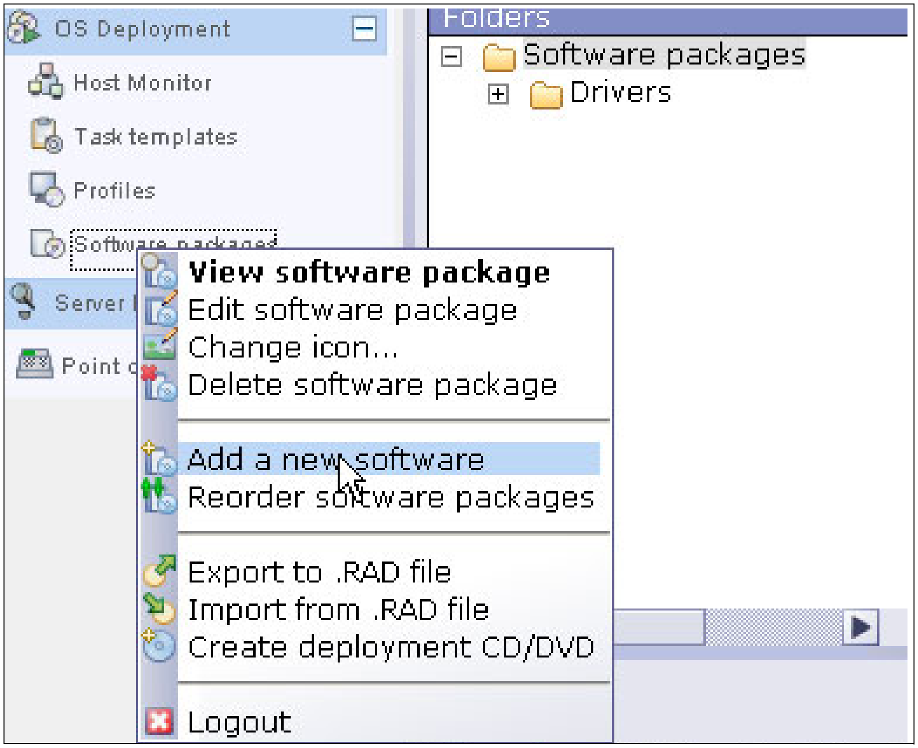
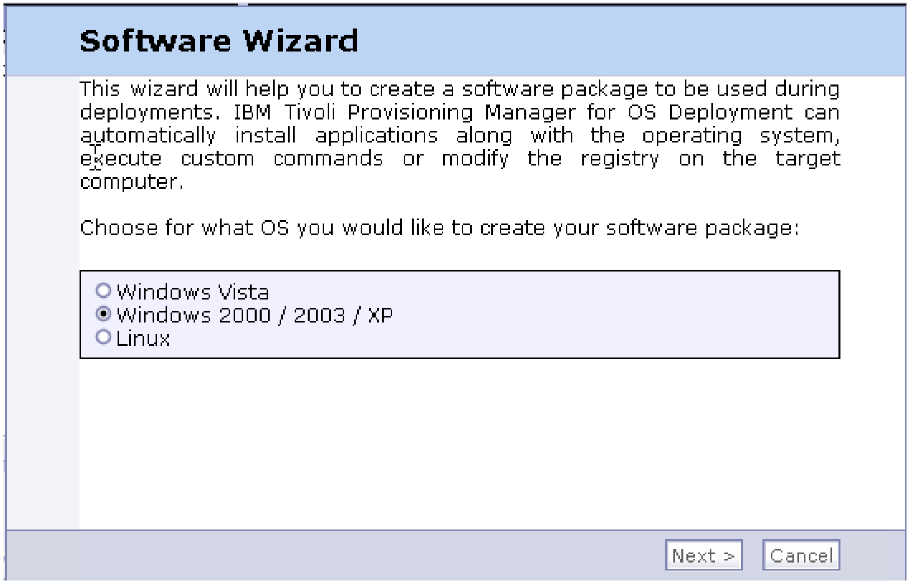


Figure 2-26 Create a new driver software package

2. Next, select the “Windows 2000/2003/XP” option and click **Next** as shown in Figure 2-27.



Software Wizard

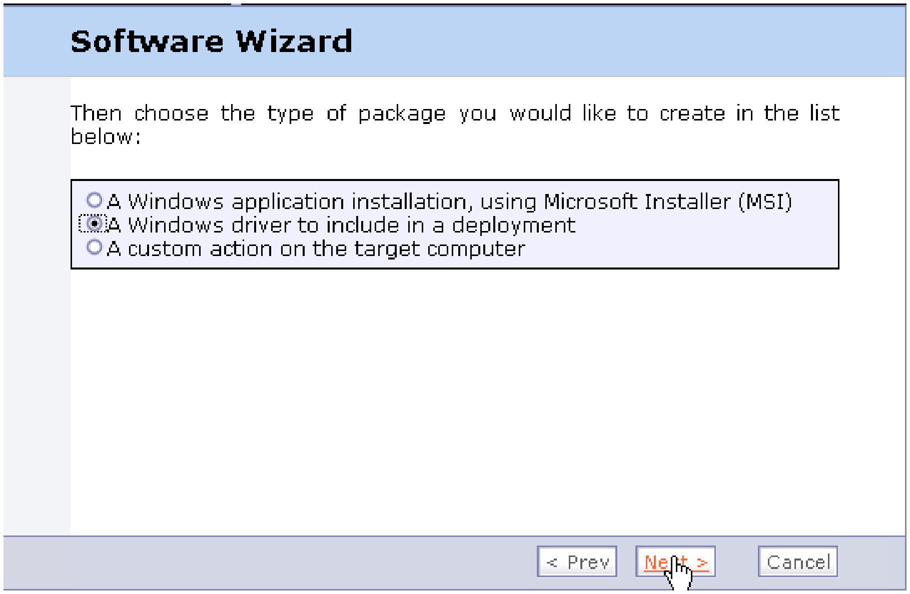
This wizard will help you to create a software package to be used during deployments. IBM Tivoli Provisioning Manager for OS Deployment can automatically install applications along with the operating system, execute custom commands or modify the registry on the target computer.

Choose for what OS you would like to create your software package:

○ Windows Vista
● Windows 2000 / 2003 / XP
○ Linux

Figure 2-27 Select a software package for the Windows Platform

3. Next, select “A Windows driver to include in a deployment” and click **Next** as shown in Figure 2-28.



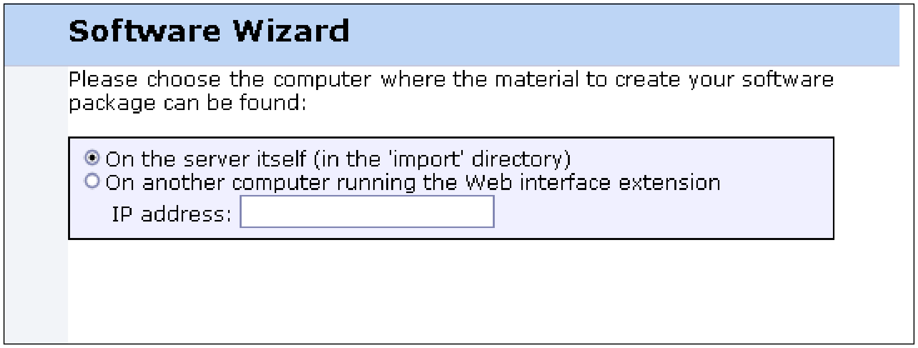
Software Wizard

Then choose the type of package you would like to create in the list below:

○ A Windows application installation, using Microsoft Installer (MSI)
● A Windows driver to include in a deployment
○ A custom action on the target computer

Figure 2-28 Select a driver software package to create

4. Next, select to look in the server's import directory for the driver location as shown in Figure 2-29 on page 39.



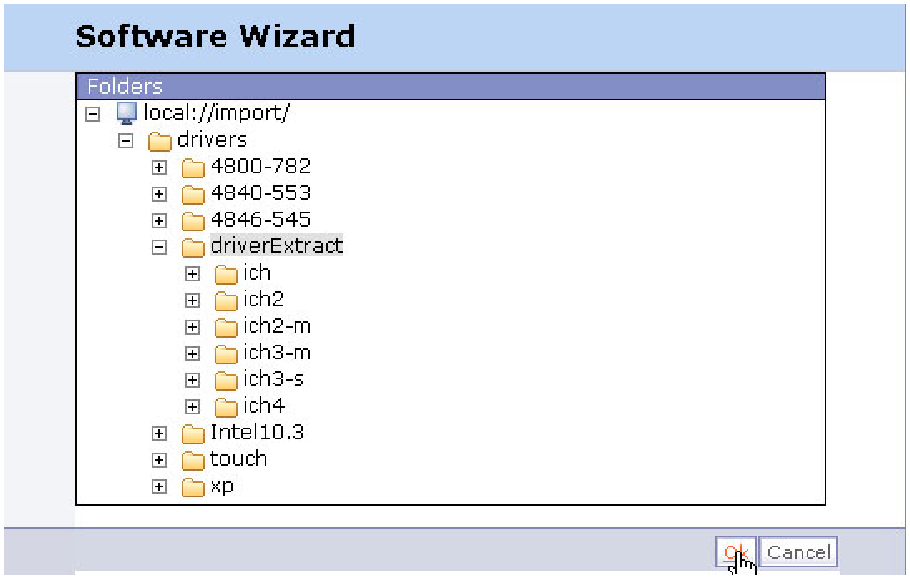
Software Wizard

Please choose the computer where the material to create your software package can be found:

● On the server itself (in the 'import' directory)
○ On another computer running the Web interface extension
IP address:

Figure 2-29 Select the local server import directory to get the driver files

5. Browse the import directory and select the driver directory location as shown in Figure 2-30.



Software Wizard

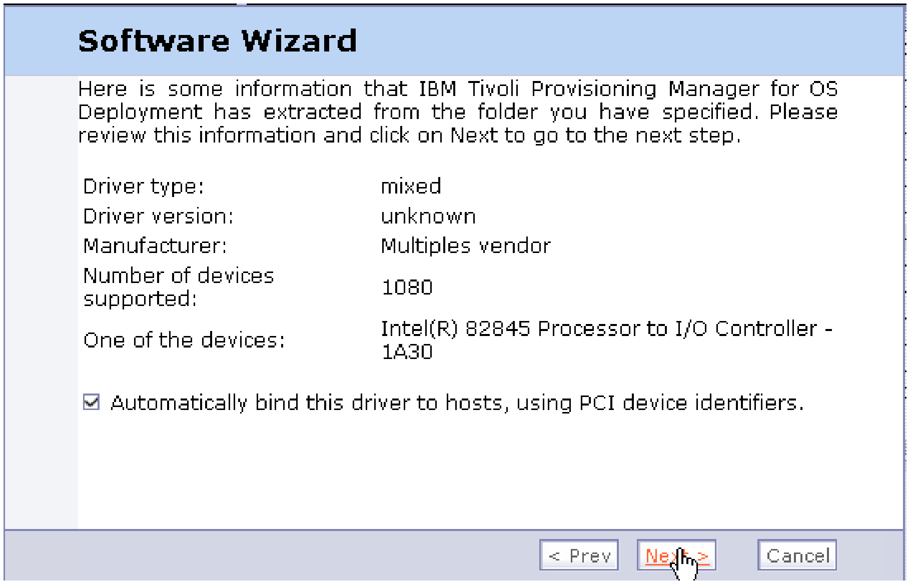
Folders

```
⊟ local://import/
    ⊟ drivers
        ⊞ 4800-782
        ⊞ 4840-553
        ⊞ 4846-545
        ⊟ driverExtract
            ⊞ ich
            ⊞ ich2
            ⊞ ich2-m
            ⊞ ich3-m
            ⊞ ich3-s
            ⊞ ich4
        ⊞ Intel10.3
        ⊞ touch
        ⊞ xp
```

Figure 2-30 Select the directory where the driver files are located

> **Note:** Point to the directory that contains the *.INF files. Most driver packages expand to several subdirectories.

6. After selecting the directory, click **Next** and you should see the following. Notice that there is a checkbox for “Automatically bind this driver to hosts, using PCI device identifiers.” as shown in Figure 2-31 on page 40. Select this checkmark.



Software Wizard

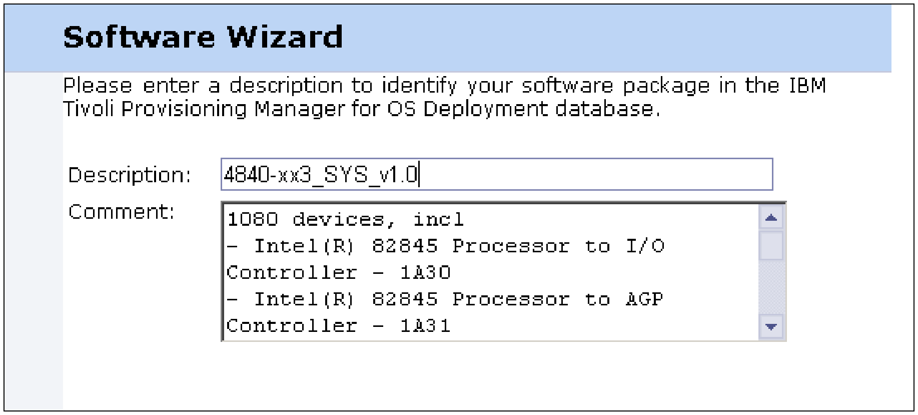
Here is some information that IBM Tivoli Provisioning Manager for OS Deployment has extracted from the folder you have specified. Please review this information and click on Next to go to the next step.

Driver type:	mixed
Driver version:	unknown
Manufacturer:	Multiples vendor
Number of devices supported:	1080
One of the devices:	Intel(R) 82845 Processor to I/O Controller - 1A30

☑ Automatically bind this driver to hosts, using PCI device identifiers.

Figure 2-31

7. Click **Next**, and you are presented with another chance to add your own comments to the driver package as shown in Figure 2-32.



Software Wizard

Please enter a description to identify your software package in the IBM Tivoli Provisioning Manager for OS Deployment database.

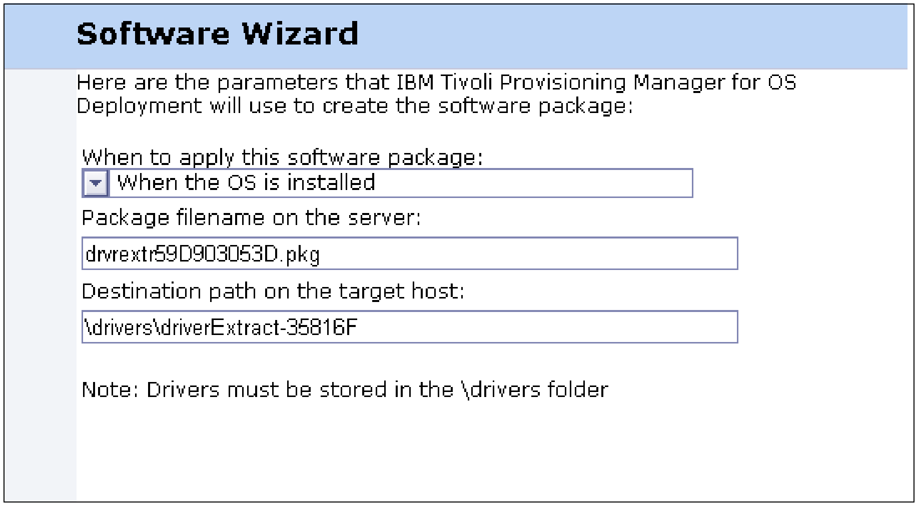
Description: 4840-xx3_SYS_v1.0

Comment:

```
1080 devices, incl
- Intel(R) 82845 Processor to I/O
Controller - 1A30
- Intel(R) 82845 Processor to AGP
Controller - 1A31
```

Figure 2-32 Naming of the software package and adding comments

8. Click **Next**, and you will be presented with where Tivoli Provisioning Manager for OS Deployment is storing the files and also at what stage the driver will be injected as shown in Figure 2-33 on page 41.



Software Wizard

Here are the parameters that IBM Tivoli Provisioning Manager for OS Deployment will use to create the software package:

When to apply this software package: When the OS is installed

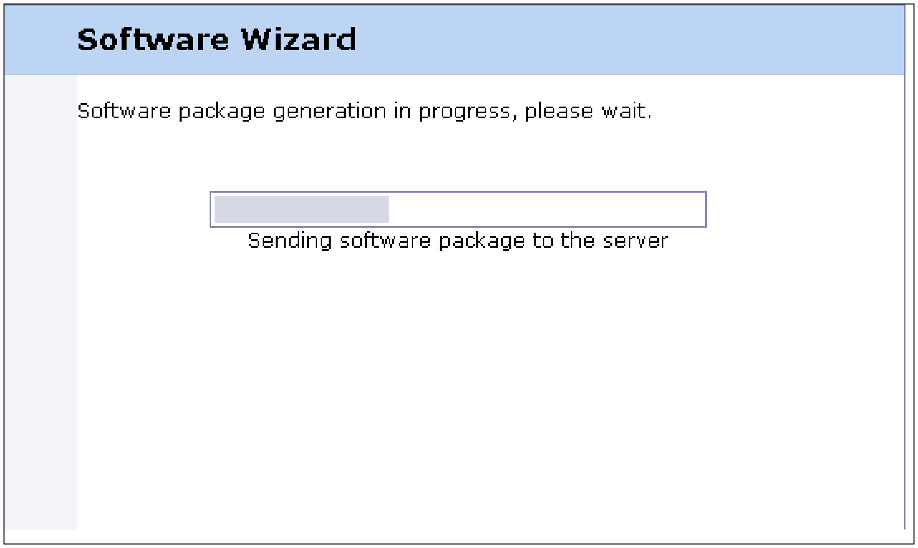
Package filename on the server: drvrextr59D903053D.pkg

Destination path on the target host: \drivers\driverExtract-35816F

Note: Drivers must be stored in the \drivers folder

Figure 2-33 Driver upload details

9. Click **Next** and the import will begin as shown in Figure 2-34.



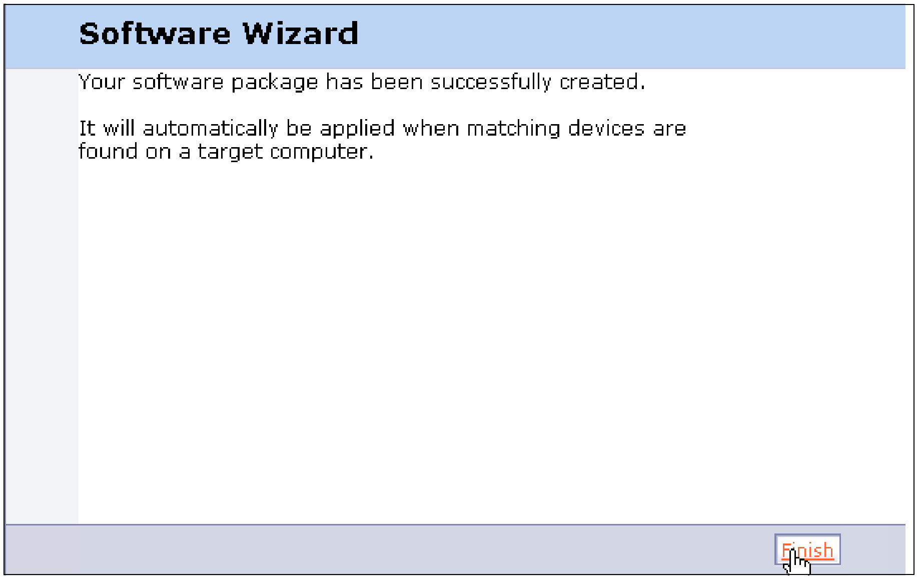
Software Wizard

Software package generation in progress, please wait.

Sending software package to the server

Figure 2-34 Driver import progress

10. Once the upload of the driver is completed, Click the Finish button as shown in Figure 2-35 on page 42.



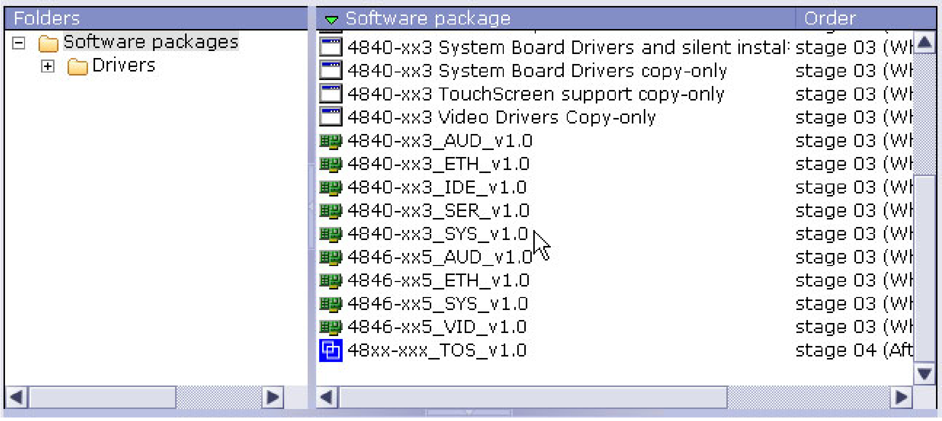
Software Wizard

Your software package has been successfully created.

It will automatically be applied when matching devices are found on a target computer.

Figure 2-35 Finishing the software package wizard

You will now have the system board driver listed in the Software Packages section of the Tivoli Provisioning Manager for OS Deployment console as shown in Figure 2-36.



Software package	Order
4840-xx3 System Board Drivers and silent instal:	stage 03 (Wł
4840-xx3 System Board Drivers copy-only	stage 03 (Wł
4840-xx3 TouchScreen support copy-only	stage 03 (Wł
4840-xx3 Video Drivers Copy-only	stage 03 (Wł
4840-xx3_AUD_v1.0	stage 03 (Wł
4840-xx3_ETH_v1.0	stage 03 (Wł
4840-xx3_IDE_v1.0	stage 03 (Wł
4840-xx3_SER_v1.0	stage 03 (Wł
4840-xx3_SYS_v1.0	stage 03 (Wł
4846-xx5_AUD_v1.0	stage 03 (Wł
4846-xx5_ETH_v1.0	stage 03 (Wł
4846-xx5_SYS_v1.0	stage 03 (Wł
4846-xx5_VID_v1.0	stage 03 (Wł
48xx-xxx_TOS_v1.0	stage 04 (Aft

Figure 2-36 Driver package sucessfully created

2.4 Deploying to a pristine system

After creating the unattended profile as shown in 2.2.3, “Creating the unattended profile” on page 22, we create a deployment scheme and deploy the profile to a target IBM SurePOS client machine. In this section we cover:

- The creation of a deployment scheme
- How to modify an unattended profile for a dynamic host name
- The process the client machine goes through during boot and installation

2.4.1 Creating a deployment scheme

Before deploying a profile on a target computer, you must specify how your profile is going to be deployed. In Tivoli Provisioning Manager for OS Deployment, this is done through **Task Templates** → **Deployment Schemes**. In order to create a deployment scheme follow the step by step instructions below:

1. First, login to the Tivoli Provisioning Manager for OS Deployment console and select **OS Deployment** → **Task Templates** → **Deployment schemes**. Right-mouse-click on **Deployment Schemes** and select **New Deployment Scheme** as shown in Figure 2-37.

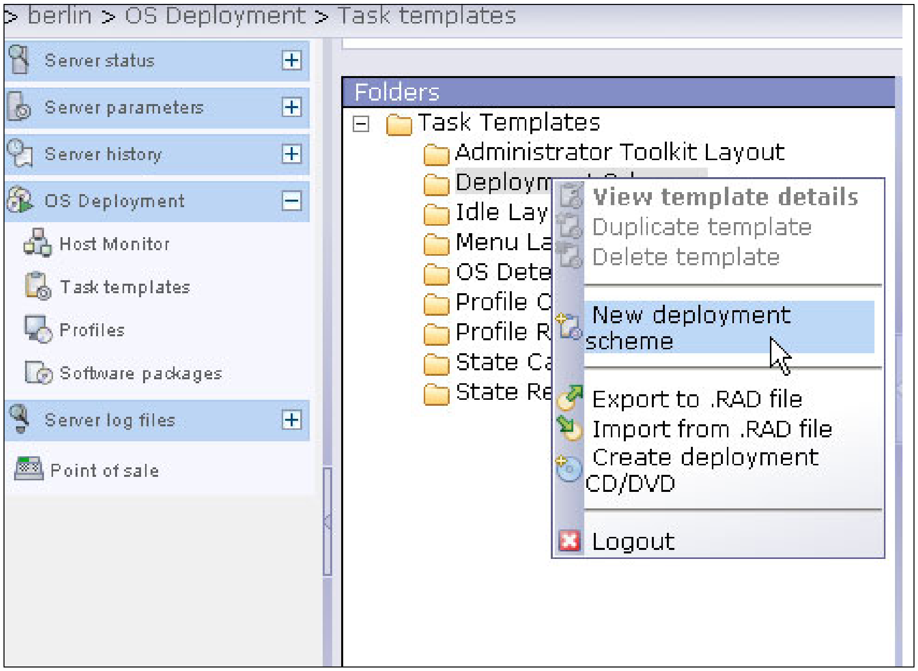
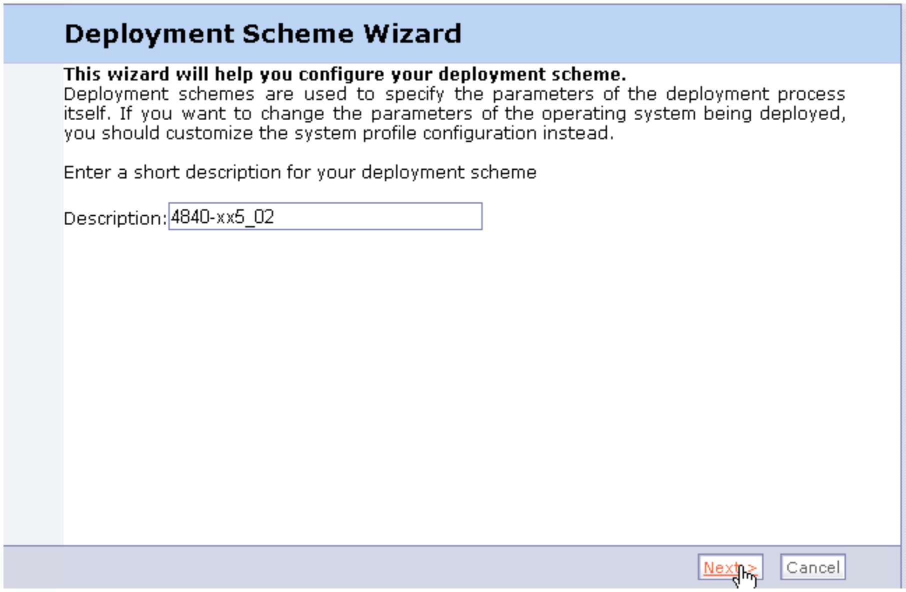


Figure 2-37 Creating a new deployment scheme

2. Select a name for the deployment scheme as shown in Figure 2-38 on page 44.



Deployment Scheme Wizard

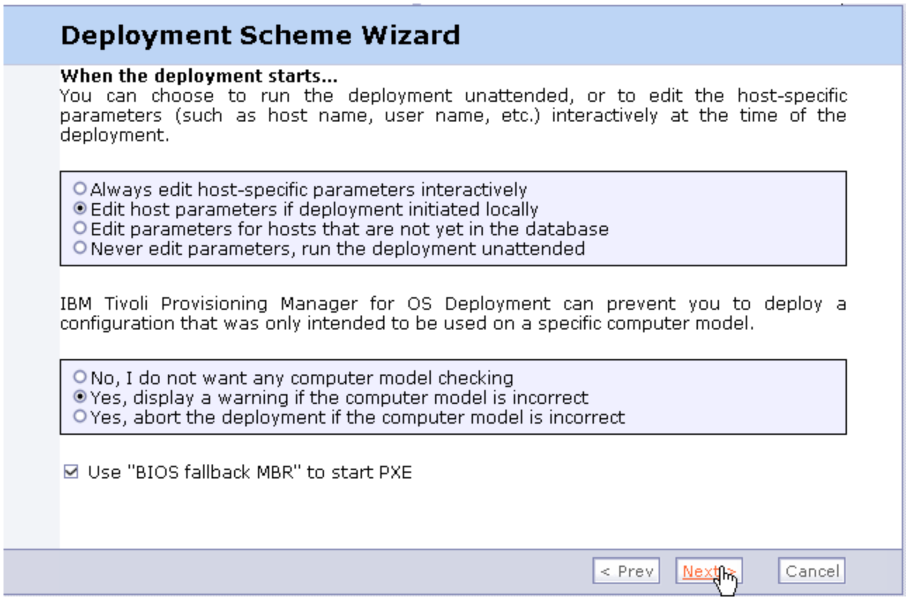
This wizard will help you configure your deployment scheme.
Deployment schemes are used to specify the parameters of the deployment process itself. If you want to change the parameters of the operating system being deployed, you should customize the system profile configuration instead.

Enter a short description for your deployment scheme

Description: 4840-xx5_02

Figure 2-38 Adding a descriptive name for the deployment scheme

3. When the deployment starts, host-specific parameters can be modified interactively during deployment or taken from the unattended install. In addition, there are other deployment options that can be set. In this case we leave the default settings as shown in Figure 2-39.



Deployment Scheme Wizard

When the deployment starts...
You can choose to run the deployment unattended, or to edit the host-specific parameters (such as host name, user name, etc.) interactively at the time of the deployment.

○ Always edit host-specific parameters interactively
● Edit host parameters if deployment initiated locally
○ Edit parameters for hosts that are not yet in the database
○ Never edit parameters, run the deployment unattended

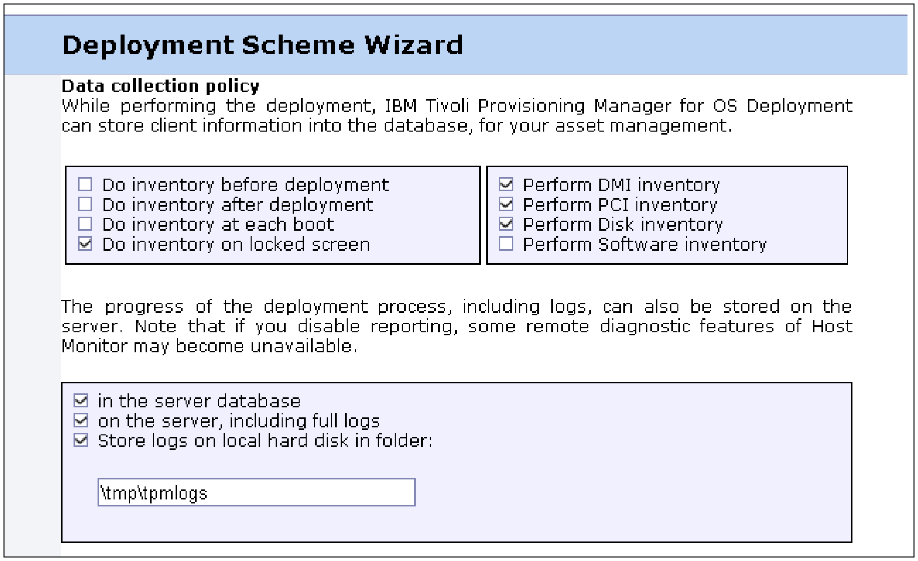
IBM Tivoli Provisioning Manager for OS Deployment can prevent you to deploy a configuration that was only intended to be used on a specific computer model.

○ No, I do not want any computer model checking
● Yes, display a warning if the computer model is incorrect
○ Yes, abort the deployment if the computer model is incorrect

☑ Use "BIOS fallback MBR" to start PXE

Figure 2-39 Defining host-specific parameters during deployments

4. Next, set the configuration for the data collection policy as shown in Figure 2-40 on page 45. In this scenario, we leave the default configuration and click **Next**.



Deployment Scheme Wizard

Data collection policy
While performing the deployment, IBM Tivoli Provisioning Manager for OS Deployment can store client information into the database, for your asset management.

☐ Do inventory before deployment
☐ Do inventory after deployment
☐ Do inventory at each boot
☑ Do inventory on locked screen

☑ Perform DMI inventory
☑ Perform PCI inventory
☑ Perform Disk inventory
☐ Perform Software inventory

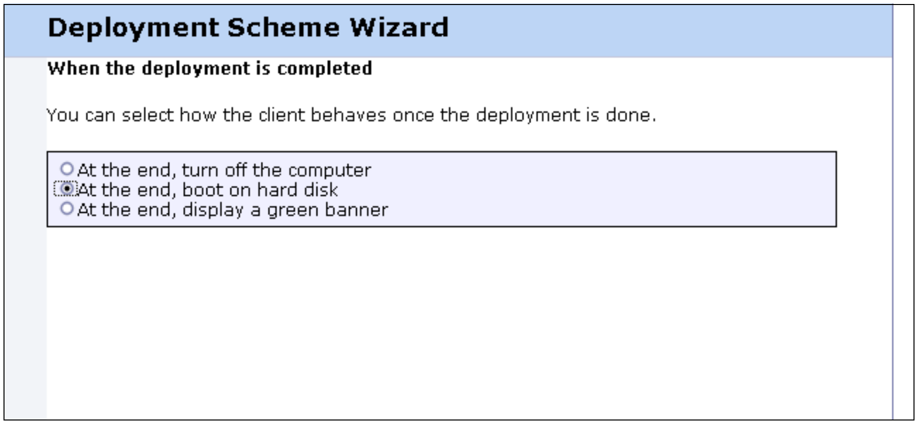
The progress of the deployment process, including logs, can also be stored on the server. Note that if you disable reporting, some remote diagnostic features of Host Monitor may become unavailable.

☑ in the server database
☑ on the server, including full logs
☑ Store logs on local hard disk in folder:

\tmp\tpmlogs

Figure 2-40 Data collection policy

5. Next, we select what to do after the deployment is completed. In our scenario we want the terminal to boot from the newly completed deployment; therefore, we select the second option as shown in Figure 2-41.



Deployment Scheme Wizard

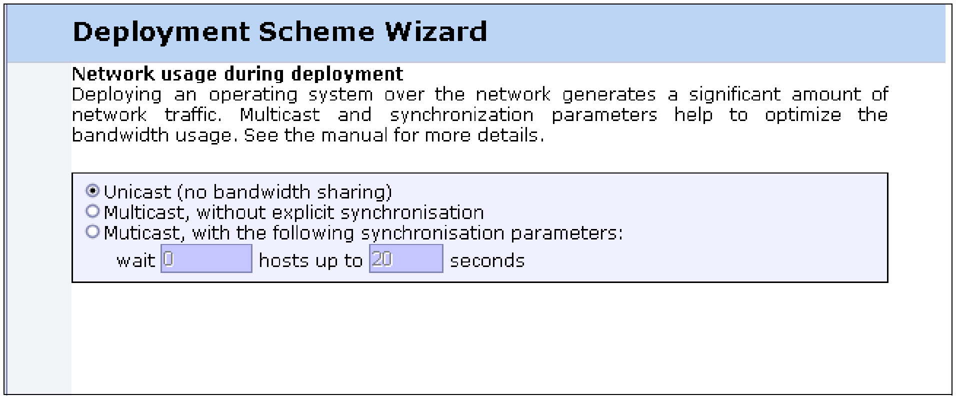
When the deployment is completed

You can select how the client behaves once the deployment is done.

○ At the end, turn off the computer
● At the end, boot on hard disk
○ At the end, display a green banner

Figure 2-41 Selecting action after completed deployment

6. Next, we configure the network usage during deployment by selecting between unicast, multicast with synchronization, and multicast without synchronization. In this scenario we take the default of unicast as shown in Figure 2-42 on page 46 which will allow the system to not share bandwidth during the installation. Please refer to section 6.3, “Network Bandwidth Considerations” on page 132 for details on the different network options.



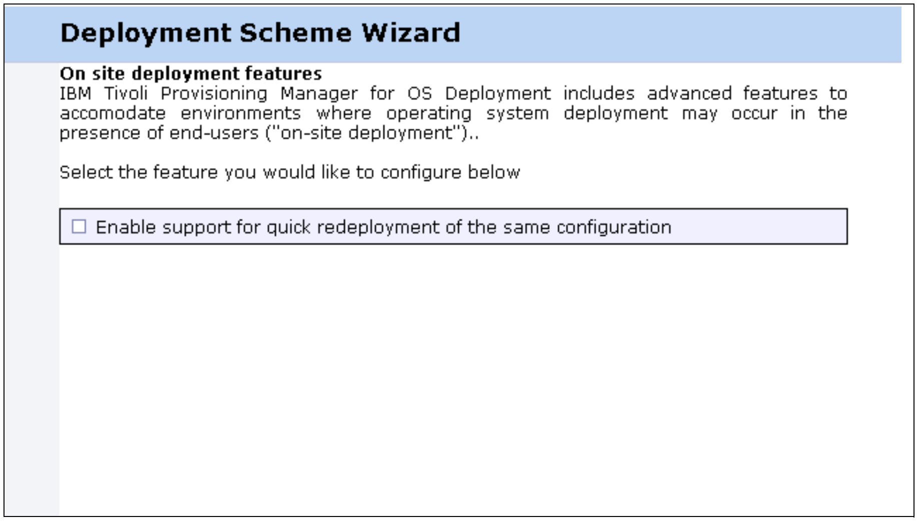
Deployment Scheme Wizard

Network usage during deployment
Deploying an operating system over the network generates a significant amount of network traffic. Multicast and synchronization parameters help to optimize the bandwidth usage. See the manual for more details.

● Unicast (no bandwidth sharing)
○ Multicast, without explicit synchronisation
○ Muticast, with the following synchronisation parameters:
wait 0 hosts up to 20 seconds

Figure 2-42 Selecting network usage

7. Next, we select the on-site redeployment features for the deployment scheme. In this scenario we take the default as shown in Figure 2-43. Redeployments are discussed in Chapter 4, “Redeployment scenarios” on page 83.



Deployment Scheme Wizard

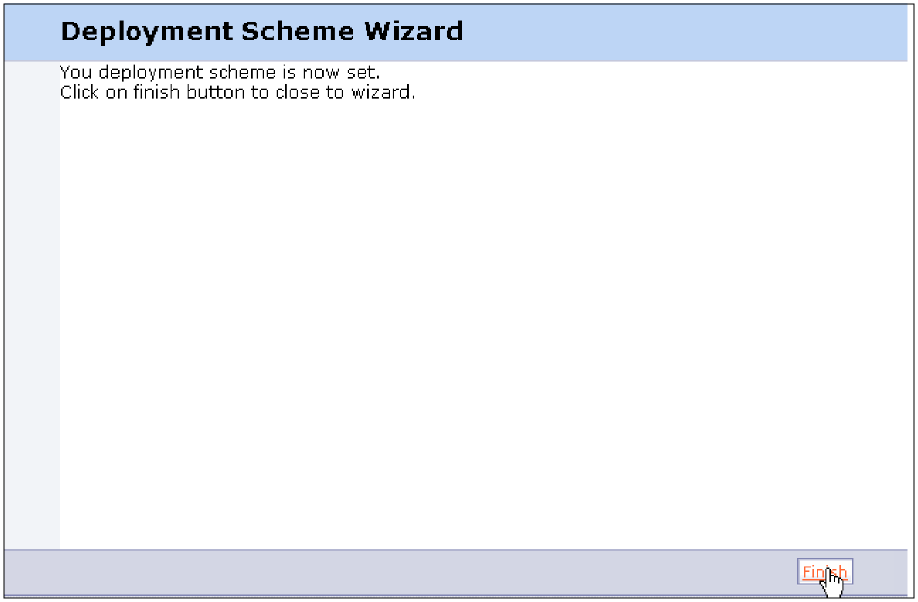
On site deployment features
IBM Tivoli Provisioning Manager for OS Deployment includes advanced features to accomodate environments where operating system deployment may occur in the presence of end-users ("on-site deployment")..

Select the feature you would like to configure below

☐ Enable support for quick redeployment of the same configuration

Figure 2-43 Optional selection of redeployment feature

8. Finally, select the finish button as shown in Figure 2-44 on page 47 to complete the creation of the deployment scheme.



Deployment Scheme Wizard

You deployment scheme is now set.
Click on finish button to close to wizard.

Figure 2-44 Finish the deployment scheme wizard

2.4.2 Modifying the unattended profile for a dynamic host name

Some organizations have very strict computer naming conventions while others are happy for a host to be assigned a number from a random pool. There is a lot to be said about the pros and cons of each naming style. However, some form of a naming standard is required in order to keep track of the different systems in the environment. This is especially true in a large retail environment with multiple locations and different types of machines. If a naming standard is not maintained it may become difficult to locate a particular machine that needs repair or determine what function the device provides. This problem only gets more complicated in a retail environment with a central IT department that manages several remote warehouses and stores each with many devices in each location. Tivoli Provisioning Manager for OS Deployment offers a number of ways to register a hostname within the system:

- Manually type a name into the Web console after a computer registers with Tivoli Provisioning Manager for OS Deployment, but has not yet had an image deployed. This is fine for one or two computers but during a major deployment it can become very laborious.
- Import a list of hostnames. This is a good way to populate the host database, especially if the computer naming convention does not rely on any characteristic of the actual computer. Each name however must be linked some way to a unique characteristic of a computer. This could be the MAC address, the UUID/GUID, the serial number, or a fixed asset tag. These could be acquired from the manufacturer with the hardware shipment. In short, Tivoli Provisioning Manager for OS Deployment must have some way of uniquely identifying a computer to allow the match up with a pre populated host name. The **import host** button is at the bottom of the **Host monitor** panel.
- Automatically generate a host name. Tivoli Provisioning Manager for OS Deployment has a variety of keywords that will allow the extraction of all or part of a key hardware identifier and build it into the hostname according to a template. This means you could incorporate all or part of the computer's serial number or asset number into its hostname.
- Let Tivoli Provisioning Manager for OS Deployment decide. Tivoli Provisioning Manager for OS Deployment will assign a random hostname.

In our scenario, we used the ability for Tivoli Provisioning Manager for OS Deployment to automatically generate a host name with the use of keyword variables. In order to achieve this the values in the Fixed Hosts properties can contain special keywords or variables that are replaced by dynamic information. This can be helpful when trying to dynamically create hostnames for systems. Below are the supported keywords:

Table 2-1 Fixed host properites keywords

Variable	Description	Syntax
IP	Full IP address received by DHCP	[IP]
MAC	hardware address	[MAC]
SN	serial number as found in DMI (SMBIOS)	[SN]
BOMID	unique host identifier in the Tivoli Provisioning Manager for OS Deployment server database	[BOMID]
AT	DMI asset tag	[AT]
GRP	deepest administrative group name to which the host belongs	[GRP]
DHCPNAME	host name as known to the DHCP server	[DHCPNAME]

Every keyword supports a range extension if you want to include only part of the dynamic information. The range starts at value 0. [IP3] corresponds to the last byte of the IP address. [IP1-3] corresponds to bytes 1 to 3. [MAC3-5] is replaced by the last three bytes of the MAC address. For AT, GRP, DHCPNAME, the range corresponds to a substring. In our example, we will be using the last three bytes of the MAC address. Below are the step by step instructions to modify the profile to add a dynamic hostname:

1. First, login to the Tivoli Provisioning Manager for OS Deployment console and select **OS Deployment** → **Profiles** and select the profile that needs the dynamic hostname. Select the **configure** button located at the bottom of the screen as shown in Figure 2-45 on page 50.

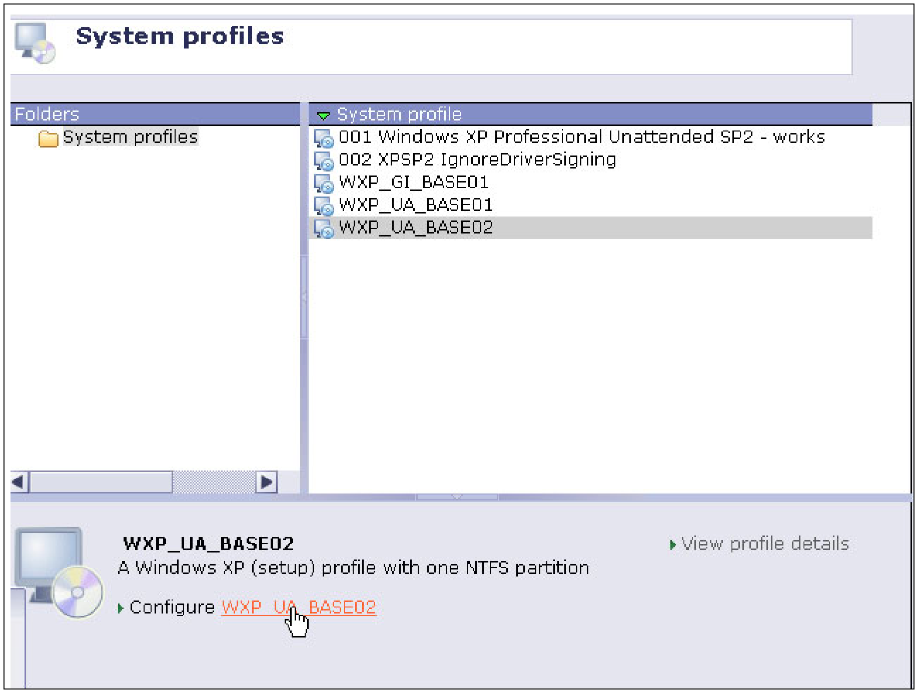


Figure 2-45 Select profile for editing

2. Next, select the edit button on the Fixed Host Properties screen as shown in Figure 2-46. This will allow manual editing of the parameters.

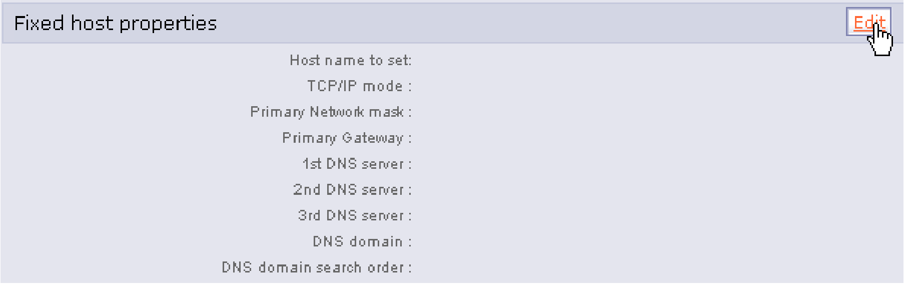
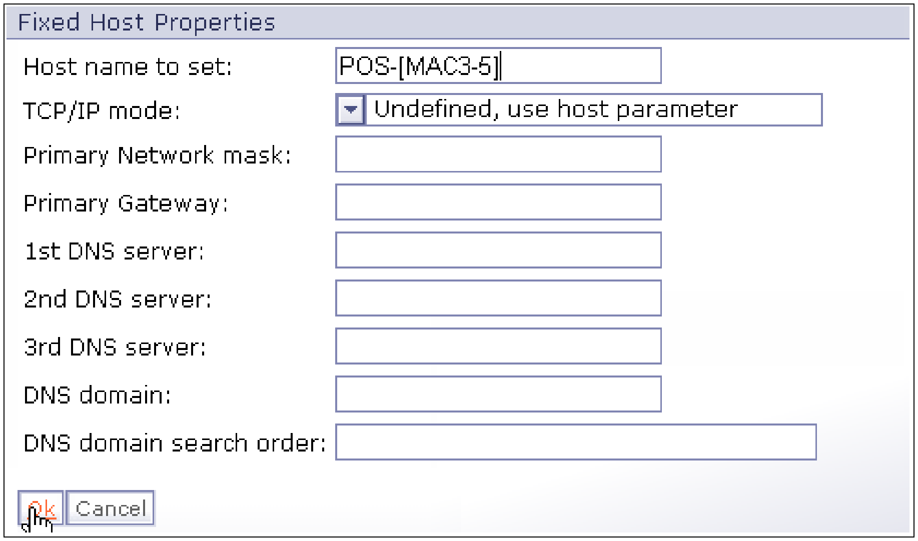


Figure 2-46 Select fixed host properties for editing

3. Finally, add the variable into the “Hostname to set” field as shown in Figure 2-47 on page 51.



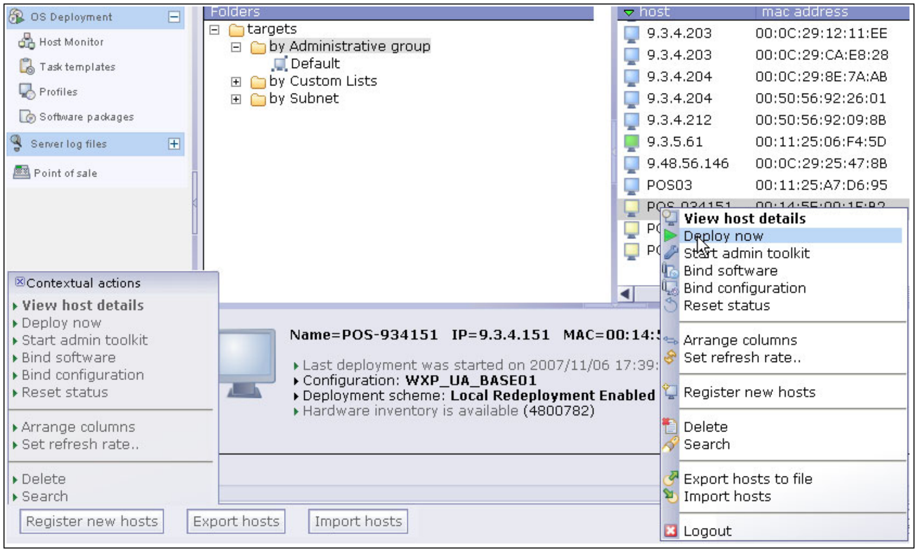
Fixed Host Properties

Host name to set:	POS-[MAC3-5]
TCP/IP mode:	Undefined, use host parameter
Primary Network mask:	
Primary Gateway:	
1st DNS server:	
2nd DNS server:	
3rd DNS server:	
DNS domain:	
DNS domain search order:	

Figure 2-47 Adding a variable into the hostname

2.4.3 Client Machine Boot and Deploy

To start the boot process and deployment of the scheme, login to the Tivoli Provisioning Manager for OS Deployment console and select **OS Deployment** → **Host Monitor**. Right mouse click on the host that needs the deployment and select “**Deploy Now**” as shown in Figure 2-48.



host	mac address
9.3.4.203	00:0C:29:12:11:EE
9.3.4.203	00:0C:29:CA:E8:28
9.3.4.204	00:0C:29:8E:7A:AB
9.3.4.204	00:50:56:92:26:01
9.3.4.212	00:50:56:92:09:8B
9.3.5.61	00:11:25:06:F4:5D
9.48.56.146	00:0C:29:25:47:8B
POS03	00:11:25:A7:D6:95
POS-934151	00:14:5E:00:15:B2
PO	
PO	

Name=POS-934151 IP=9.3.4.151 MAC=00:14:5

- Last deployment was started on 2007/11/06 17:39:
- Configuration: **WXP_UA_BASE01**
- Deployment scheme: **Local Redeployment Enabled**
- Hardware inventory is available (4800782)

Figure 2-48 Starting the actual deployment

The Deploy Now feature should trigger that the client machine performs a network boot in order to load the Tivoli Provisioning Manager for OS Deployment mini operating system. This is a simple operating system that contacts the Tivoli Provisioning Manager of OS Deployment server and runs the deploy on the target machine. Below is the process the client machine runs in order to accomplish the deploy now function:

1. Power On: A user or a wake-up event starts the client boot sequence.
2. Network Boot: The BIOS configuration (boot order), a hot key (typically the **F12**), or wake-up event instructs the computer to boot on the network.
3. IP address discovery: The client machine broadcasts a DHCP request for an IP address. Any DHCP server which knows the client or which has a pool of freely distrubutable dynamic addresses sends an IP address. The client takes the first answer and confirms it to the server. In addition to the IP Address, the DHCP server gives some other network parameters to the client, as well as information on the boot procedure.
4. Boot server discovery: The client computer then proceeds to the discovery of the boot server. The boot server is responsible for delivering a network boot program to the client. It is not necessarily the same computer as the DHCP server. The client responds to the first boot server which replies and downloads a small program using a simple multicast protocol (MTFTP).
5. Server connection: If the network boot program is the deployment engine, it establishes a secure (encrypted) connection to the Tivoli Provisioning

Manager for OS Deployment server and receives instructuions form the server to determine the name of the program to execute.

6. The client determines that it is starting a new deployment and queries the server for relevant deployment configuration. The client performs hardware discovery through DMI and PCI system calls. If specified in the configuration, it prompts the user for additional deployment information. The client then queries the ODBC/JDBC™ database for all relevant information regarding the operating system and the software packages to be installed and dynamically generates a deployment script.
7. The client partitions its hard disk according to the information retreived from the database. A small bootstrap is also written to the hard disk, so as to be able to take over any subsequent reboot on the hard disk. This is called the fake MBR.
8. The client initiates a batch multicast transfer for all files needed during the deployment. The files are downloaded in the order which optimizes the efficiency of the multicast download. A virtual image of the wanted hard-disk state is built by merging the base operating system image and all incremental images and other software updates. The data is then written onto the disk.
9. An answer file is dynamically generated, providing all necessary information for an unattended configuration of the operating system image. The client computer boots in the mini-setip, and completes operating system installation and executes unatteded setup command lines for the selected software packages. The client reboots and Tivoli Provisioning Manager for OS Deployment takes control again. If the computer is still connected to the network, it automatically uipdates the deployment status in the database.
10. When everything is done, the deployment process terminates by either turning off the computer, starting up into the operating system, restarting the computer, or displaying a green banner.

3

Mass-Distributions

In this chapter we cover the typical mass distribution scenarios. We take a base point-of-sale system that we deployed with the unattended profile in previous chapter, and go through the steps for creating a cloning profile based on that unattended installation for mass distribution to a greater population of point-of-sale devices. The topics we cover include.

- Preparing a system for being captured
- Capturing the image and creating the cloning profile
- Adding additional drivers and creating rules for different hardware types
- Deploying the cloning profiles

3.1 Creating a cloned profile for Windows XP

Tivoli Provisioning Manager for OS Deployment's native mode of operation is centered around cloning system profiles. Deployment through the cloning method is faster than an unattended installation. In this section we will explore the details and the steps required to clone a system.

3.1.1 Preparing the donor system

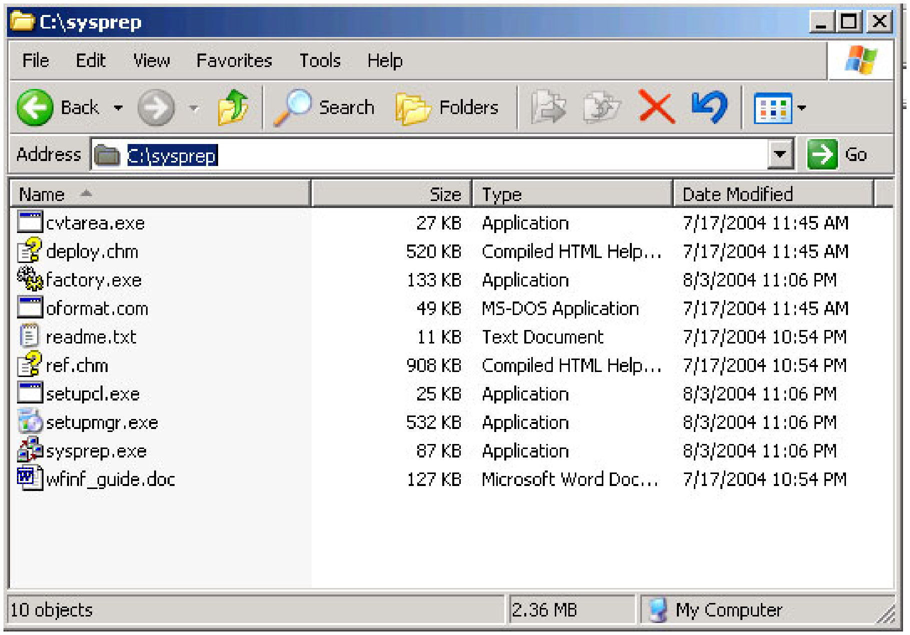
Tivoli Provisioning Manager for OS Deployment does not perform any clean up on your machine. Before we can clone a Windows XP machine, we must therefore make sure that the system is as clean as possible. This includes the following cleanup activities:

- Empty the system recycle bin
- Delete the internet cached files - cookies and history
- Delete temporary directories and files
- Disconnect any network shares and remote printers

After the cleanup process has been completed perform the following activities:

1. Login to the system that is to be cloned.
2. Before we can create a windows profile we have to run a Microsoft utility called **sysprep** on the system that will be our master image for future cloning.

   Sysprep places the operating system in a condition that is as though it was just installed on the systerm and before the inital windows setup occurs. Sysprep is available from Microsoft's web site. A link is provided in the section "Other publications" on page 141. The sysprep file we used for this project was WindowsXP-KB838080-SP2-DeployTools-ENU.cab. Extract the cab file to c:\sysprep as shown in Figure 3-1 on page 57.

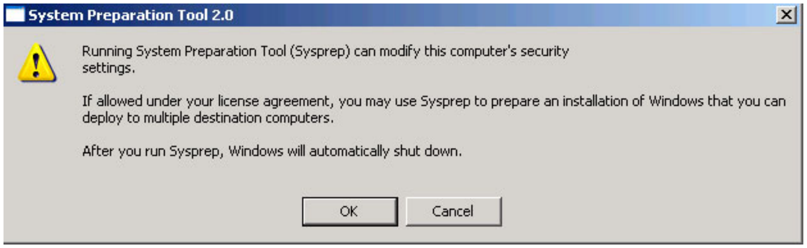


Name	Size	Type	Date Modified
cvtarea.exe	27 KB	Application	7/17/2004 11:45 AM
deploy.chm	520 KB	Compiled HTML Help...	7/17/2004 11:45 AM
factory.exe	133 KB	Application	8/3/2004 11:06 PM
oformat.com	49 KB	MS-DOS Application	7/17/2004 11:45 AM
readme.txt	11 KB	Text Document	7/17/2004 10:54 PM
ref.chm	908 KB	Compiled HTML Help...	7/17/2004 10:54 PM
setupcl.exe	25 KB	Application	8/3/2004 11:06 PM
setupmgr.exe	532 KB	Application	8/3/2004 11:06 PM
sysprep.exe	87 KB	Application	8/3/2004 11:06 PM
wfinf_guide.doc	127 KB	Microsoft Word Doc...	7/17/2004 10:54 PM

10 objects 2.36 MB My Computer

Figure 3-1 Sysprep files extracted

3. Next, run C:\sysprep\sysprep.exe and click **ok** on the warning message as shown in Figure 3-2.



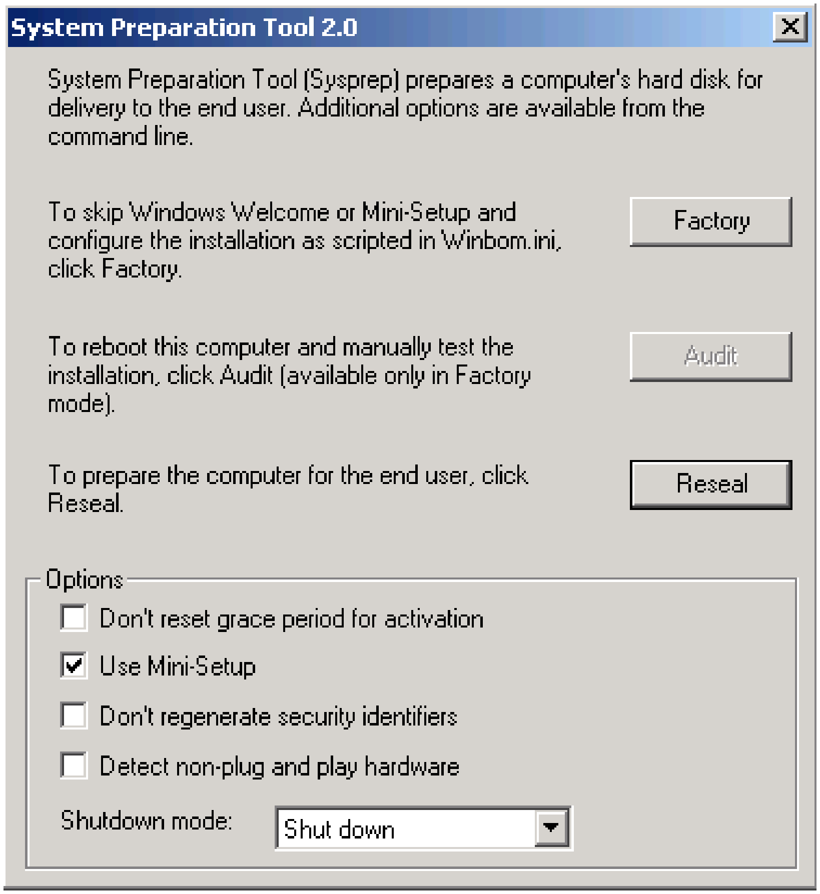
Running System Preparation Tool (Sysprep) can modify this computer's security settings.

If allowed under your license agreement, you may use Sysprep to prepare an installation of Windows that you can deploy to multiple destination computers.

After you run Sysprep, Windows will automatically shut down.

Figure 3-2 Warning message for security modification

4. Select “**mini-setup**”. Ensure that the Shutdown Mode is set to “**Shutdown**”, then click **reseal** as shown in Figure 3-3 on page 58.



System Preparation Tool 2.0

System Preparation Tool (Sysprep) prepares a computer's hard disk for delivery to the end user. Additional options are available from the command line.

To skip Windows Welcome or Mini-Setup and configure the installation as scripted in Winbom.ini, click Factory.

To reboot this computer and manually test the installation, click Audit (available only in Factory mode).

To prepare the computer for the end user, click Reseal.

Options

□ Don't reset grace period for activation

☑ Use Mini-Setup

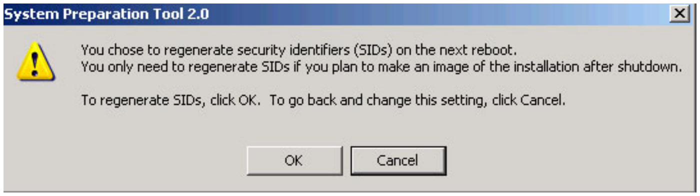
□ Don't regenerate security identifiers

□ Detect non-plug and play hardware

Shutdown mode: Shut down

Figure 3-3 Options for the System Preparation Tool

5. Click **ok** on the warning dialog that appears and then after a short delay the machine will be shutdown and we are ready to capture the image as shown in Figure 3-4



System Preparation Tool 2.0

You chose to regenerate security identifiers (SIDs) on the next reboot.
You only need to regenerate SIDs if you plan to make an image of the installation after shutdown.

To regenerate SIDs, click OK. To go back and change this setting, click Cancel.

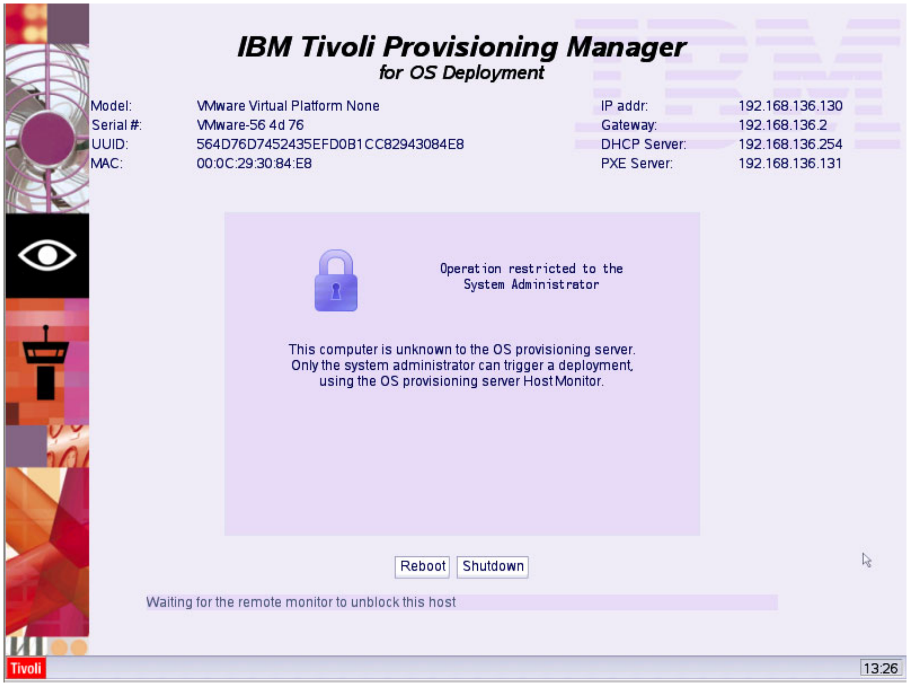
Figure 3-4 Warning for sysprep

The system is now ready for system capture.

3.1.2 Capturing the system image

1. Power on the Window XP System that is to be cloned and boot it to the network so that Tivoli Provisioning Manager for OS Deployment can discover and manage it as shown in Figure 3-5 on page 59. After the TPM server identifies the computer and writes a basic hardware scan data into the Tivoli Provisioning Manager for OS Deployment database, the guest will display the following screen. If you do not see this screen within a 30 seconds of the splash screen then you may have some server communication issues.

> **Tip:** Forcing the IBM SurePOS system to boot from the network may require changes to the boot order. This is described in Appendix A, “Alternate boot sequence on POS systems” on page 133



IBM Tivoli Provisioning Manager
for OS Deployment

Model: VMware Virtual Platform None
Serial #: VMware-56 4d 76
UUID: 564D76D7452435EFD0B1CC82943084E8
MAC: 00:0C:29:30:84:E8

IP addr: 192.168.136.130
Gateway: 192.168.136.2
DHCP Server: 192.168.136.254
PXE Server: 192.168.136.131

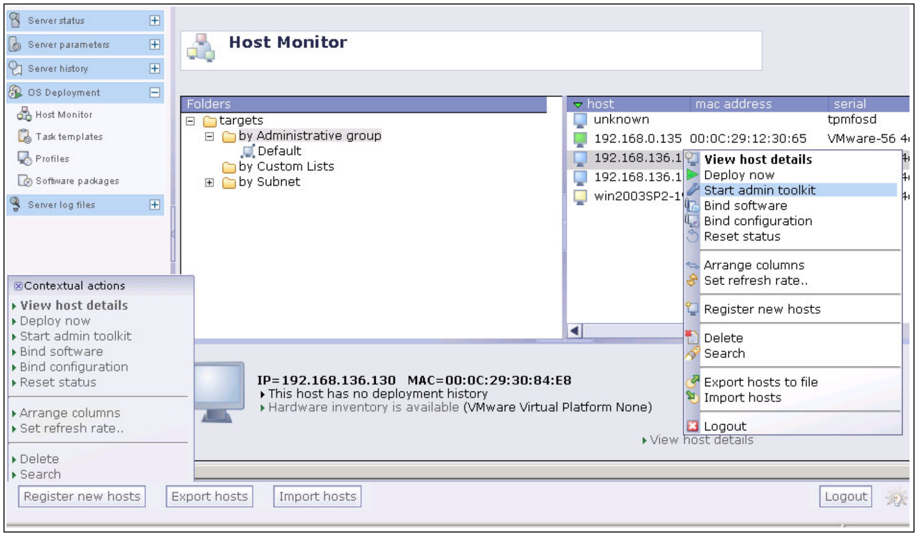
Operation restricted to the
System Administrator

This computer is unknown to the OS provisioning server.
Only the system administrator can trigger a deployment,
using the OS provisioning server Host Monitor.

Waiting for the remote monitor to unblock this host

Figure 3-5 Booting the system to be cloned

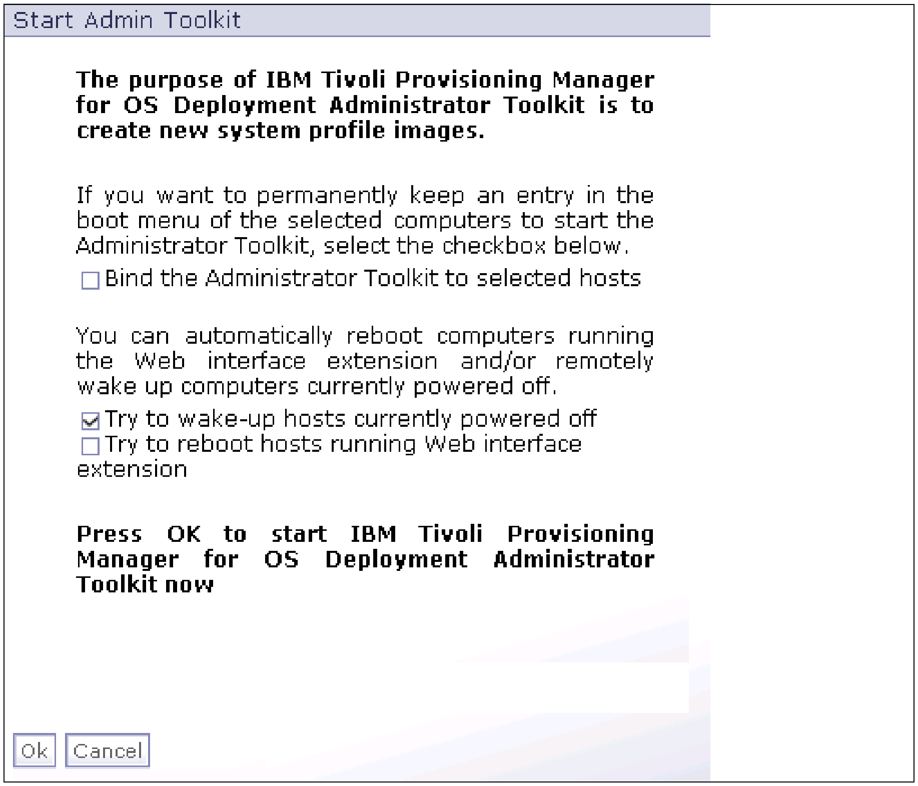
2. Login to the server Console and select the **OS Deployment** → **Host Monitor** in the left panel. Select the newly discovered system in the Host Monitor’s host view and choose **Start admin toolkit** from the left panel menu. Or, right-click on the discovered host and select **Start admin toolkit** from the pop-up menu as shown in Figure 3-6 on page 60.



IP=192.168.136.130 MAC=00:0C:29:30:84:E8
This host has no deployment history
Hardware inventory is available (VMware Virtual Platform None)
View host details

Figure 3-6 Starting the admin tookit

3. Next, take the default setting and click the **OK** button on the **Start Admin toolkit** options screen as shown in Figure 3-7.



Start Admin Toolkit

The purpose of IBM Tivoli Provisioning Manager for OS Deployment Administrator Toolkit is to create new system profile images.

If you want to permanently keep an entry in the boot menu of the selected computers to start the Administrator Toolkit, select the checkbox below.

□ Bind the Administrator Toolkit to selected hosts

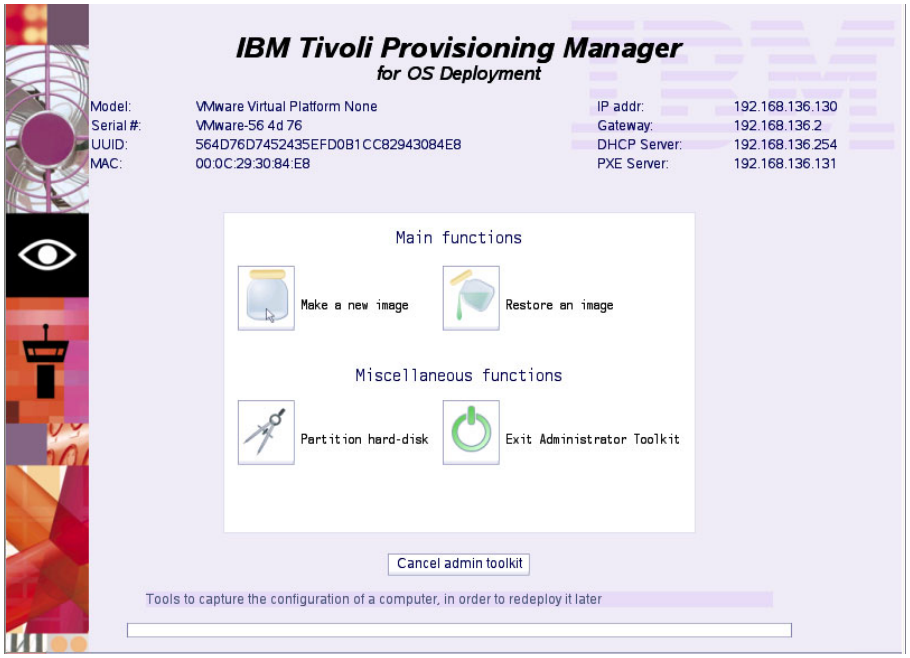
You can automatically reboot computers running the Web interface extension and/or remotely wake up computers currently powered off.

☑ Try to wake-up hosts currently powered off
□ Try to reboot hosts running Web interface extension

Press OK to start IBM Tivoli Provisioning Manager for OS Deployment Administrator Toolkit now

Figure 3-7 Admin Tookit Options

4. Go to client SurePOS system that is being cloned and the admin toolkit should be loaded. Select “**Make a new image**” as shown in Figure 3-8 on page 62.

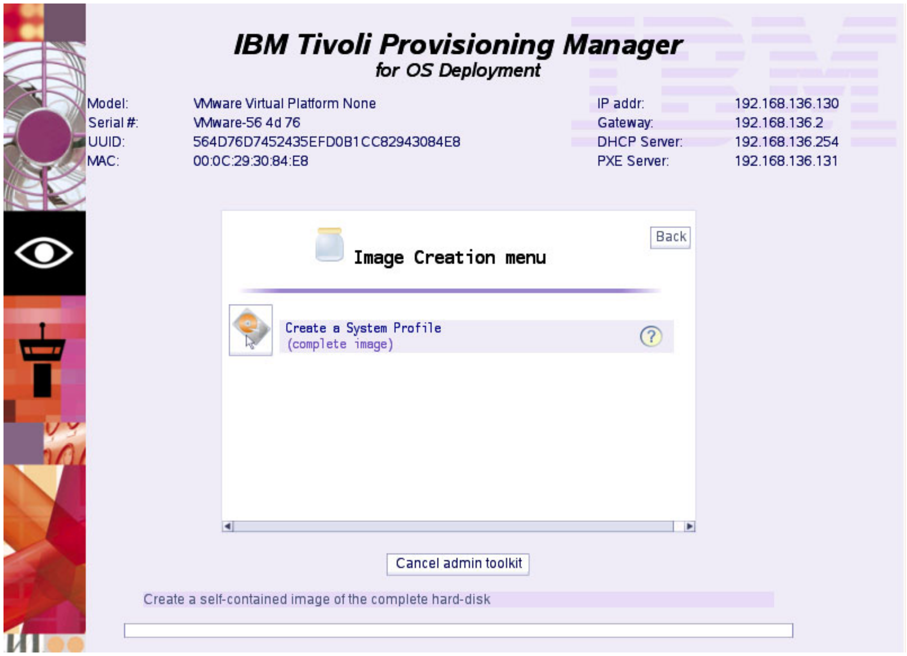


Model:	VMware Virtual Platform None	IP addr:	192.168.136.130
Serial #:	VMware-56 4d 76	Gateway:	192.168.136.2
UUID:	564D76D7452435EFD0B1CC82943084E8	DHCP Server:	192.168.136.254
MAC:	00:0C:29:30:84:E8	PXE Server:	192.168.136.131

Tools to capture the configuration of a computer, in order to redeploy it later

Figure 3-8 Select make new image from the admin toolkit

5. Next, select “**Create a System Profile**” as shown in Figure 3-9 on page 63.



Model: VMware Virtual Platform None
Serial #: VMware-56 4d 76
UUID: 564D76D7452435EFD0B1CC82943084E8
MAC: 00:0C:29:30:84:E8

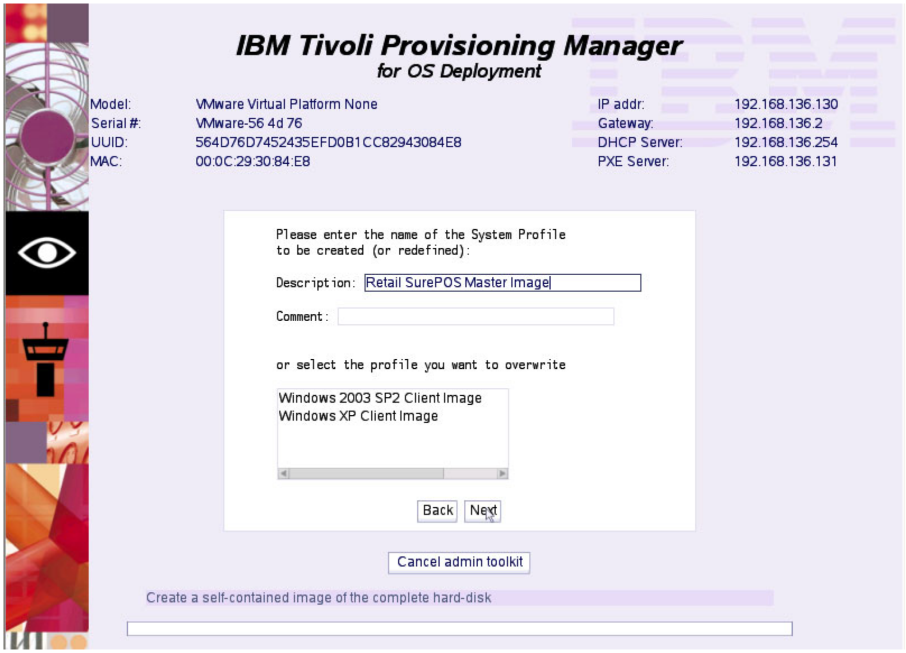
IP addr: 192.168.136.130
Gateway: 192.168.136.2
DHCP Server: 192.168.136.254
PXE Server: 192.168.136.131

Create a System Profile
(complete image)

Create a self-contained image of the complete hard-disk

Figure 3-9 Selecting create a system profile

6. Click in the **Description** field and press the `ESC` key. That will clear out the text. Then type something like, “Retail SurePOS Master Image” as shown in Figure 3-10 on page 64.



IBM Tivoli Provisioning Manager
for OS Deployment

Model: VMware Virtual Platform None
Serial #: VMware-56 4d 76
UUID: 564D76D7452435EFD0B1CC82943084E8
MAC: 00:0C:29:30:84:E8

IP addr: 192.168.136.130
Gateway: 192.168.136.2
DHCP Server: 192.168.136.254
PXE Server: 192.168.136.131

Please enter the name of the System Profile
to be created (or redefined):

Description: Retail SurePOS Master Image

Comment:

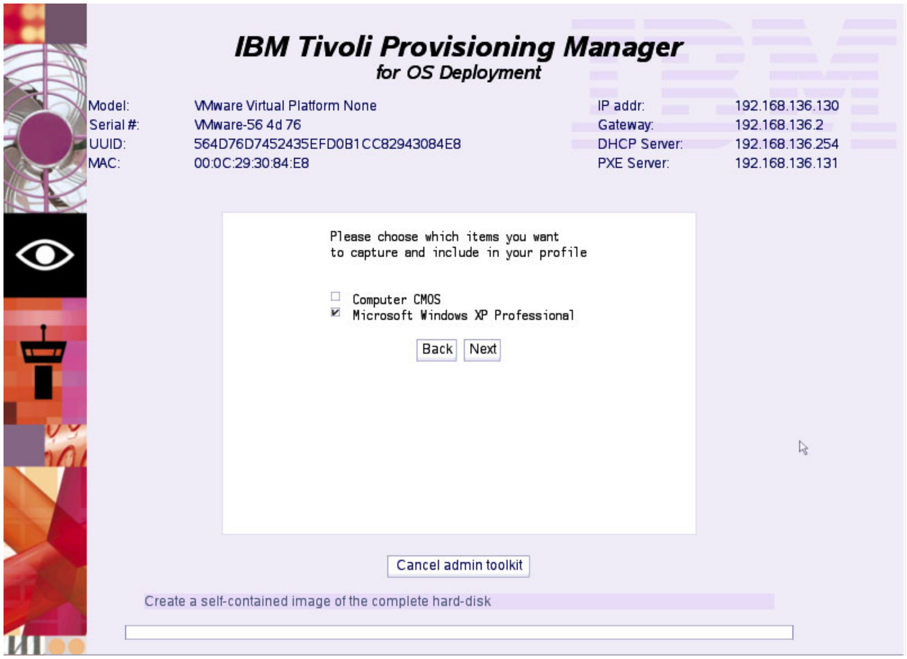
or select the profile you want to overwrite

Windows 2003 SP2 Client Image
Windows XP Client Image

Create a self-contained image of the complete hard-disk

Figure 3-10 specify a name for the image to be captured

7. In the next panel, Tivoli Provisioning Manager for OS Deployment has actually scanned the system itself and detected the specific version of the Operating System installed as shown in Figure 3-11 on page 65.



Model: VMware Virtual Platform None
Serial #: VMware-56 4d 76
UUID: 564D76D7452435EFD0B1CC82943084E8
MAC: 00:0C:29:30:84:E8

IP addr: 192.168.136.130
Gateway: 192.168.136.2
DHCP Server: 192.168.136.254
PXE Server: 192.168.136.131

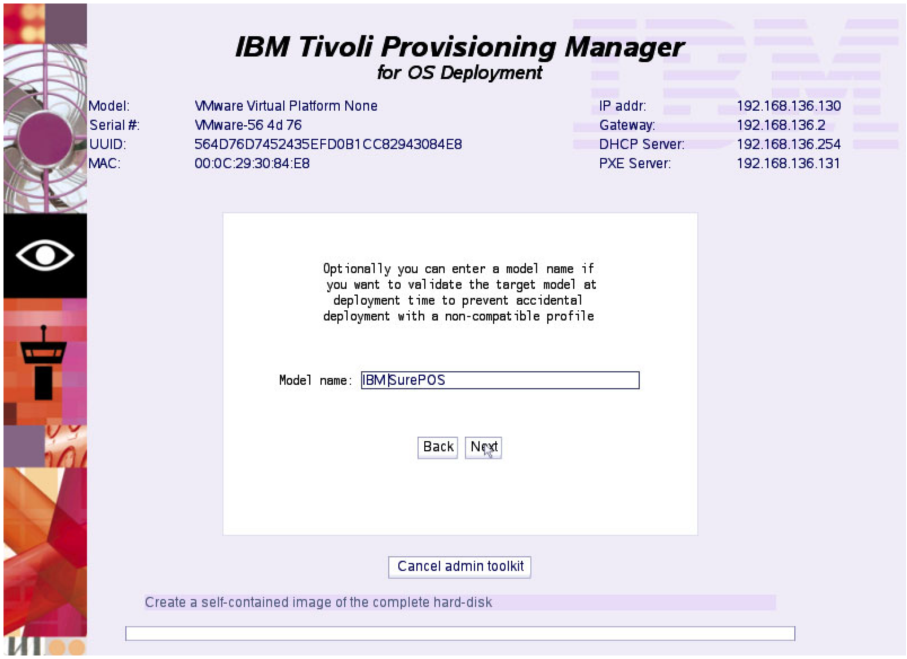
Please choose which items you want
to capture and include in your profile

□ Computer CMOS
☑ Microsoft Windows XP Professional

Create a self-contained image of the complete hard-disk

Figure 3-11 Verify the Operating system for capture

8. In the next panel enter the model number to ensure that the profile is deployed only to the proper model. In this scenario the image is being captured for use across all of our different IBM SurePOS system models; therefore, we use the generic IBM SurePOS as the model as shown in Figure 3-12 on page 66.



IBM Tivoli Provisioning Manager
for OS Deployment

Model: VMware Virtual Platform None
Serial #: VMware-56 4d 76
UUID: 564D76D7452435EFD0B1CC82943084E8
MAC: 00:0C:29:30:84:E8

IP addr: 192.168.136.130
Gateway: 192.168.136.2
DHCP Server: 192.168.136.254
PXE Server: 192.168.136.131

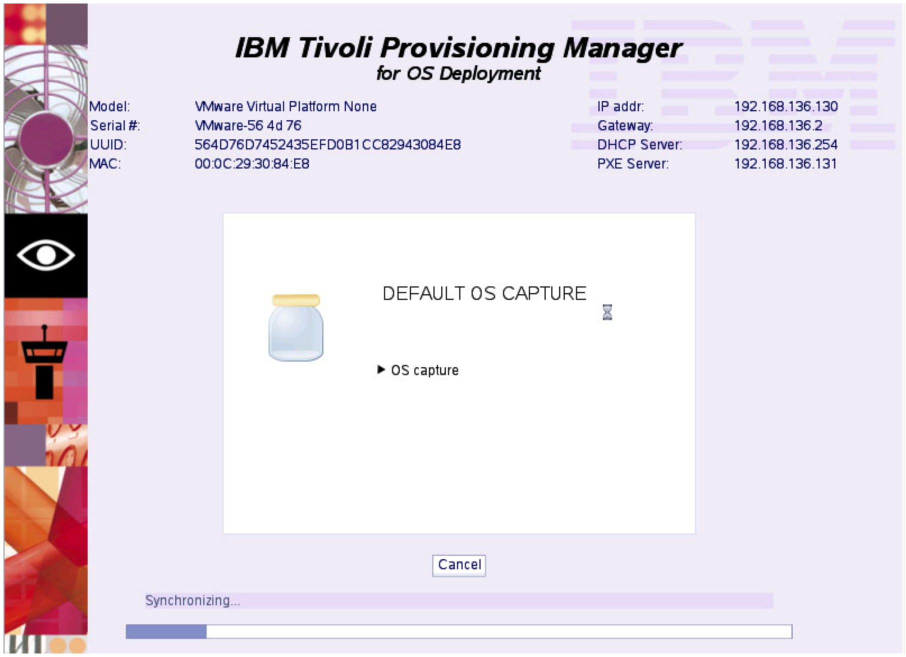
Optionally you can enter a model name if you want to validate the target model at deployment time to prevent accidental deployment with a non-compatible profile

Model name: IBM SurePOS

Create a self-contained image of the complete hard-disk

Figure 3-12 Specify the model for the image

9. Finally, click the **Next** button and the image will begin to be captured. The image build will take several minutes. This time will vary greatly depending on the size of the image, and the network between client and server, as shown in Figure 3-13 on page 67.



IBM Tivoli Provisioning Manager
for OS Deployment

Model:	VMware Virtual Platform None	IP addr:	192.168.136.130
Serial #:	VMware-56 4d 76	Gateway:	192.168.136.2
UUID:	564D76D7452435EFD0B1CC82943084E8	DHCP Server:	192.168.136.254
MAC:	00:0C:29:30:84:E8	PXE Server:	192.168.136.131

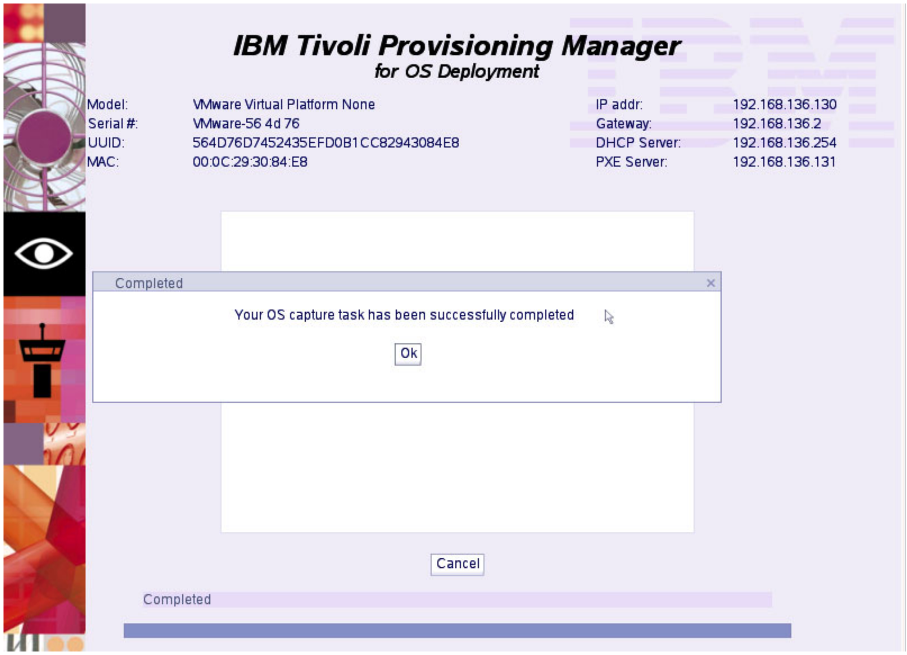
DEFAULT OS CAPTURE

▸ OS capture

Synchronizing...

Figure 3-13 Capturing the OS image

10. After the capture has completed successfully click **ok** to confirm the successful completion of the image capture as shown in Figure 3-14 on page 68.



IBM Tivoli Provisioning Manager
for OS Deployment

Model:	VMware Virtual Platform None	IP addr:	192.168.136.130
Serial #:	VMware-56 4d 76	Gateway:	192.168.136.2
UUID:	564D76D7452435EFD0B1CC82943084E8	DHCP Server:	192.168.136.254
MAC:	00:0C:29:30:84:E8	PXE Server:	192.168.136.131

Completed

Your OS capture task has been successfully completed

Completed

Figure 3-14 completed image capture

We now have an image on the Tivoli Provisioning Manager for OS Deployment server, that we can use for deployment to multiple systems. Before we do this, however, it is recommended to do some adjustments, including adding device drivers and define hostnaming standards.

3.1.3 Configuring the system profile

A significant characteristic about Tivoli Provisioning Manager for OS Deployment is that we have not simply copied the disk sectors to create the clone image. Instead, we copied the files from the donor machine. This means that we can now browse and change the details of the profile after it is captured. From here you can do the following:

- Add and delete files and directories from the image
- Change the hard disk layout
- Review the binding details for computer models
- Change and view the system code page
- Add additional user binding categories

If we edit the profile details, we can add system category information, which then allows us to associate this profile with specific software packages. After we finish with the profile details, we can modify the details of the disk partitions in the image. In the profile configuration summary we see that we can make custom additions to the sysprep.inf file. Remember that this file is used when the image is deployed to a new target. Such modifications are useful to allow us to run custom actions when the deployment is completed. They might include the following:

- A script to update an associated Change Record
- A script to send an e-mail notification to an Administrator

The sysprep process is documented at the following web site:

http://www.microsoft.com/technet/prodtechnol/winxppro/deploy/duplication.mspx

Details of the contents of the sysprep.inf file are documented at the following Web site:

http://technet2.microsoft.com/WindowsVista/en/library/71b576bd-cca6-466f-a1db-16500be3098f1033.mspx?mfr=true

If you want to do something simple like run a script after installation completes, then see Example 3-1, which gives you the critical but incomplete items from the sysprep.inf file that you will need. In this example, we run the c:\run_this_command.cmd file the first time that the target machine boots after installation.

Example 3-1 running a script after deployment is completed

```
[Unattended]
[GuiUnattended]
AutoLogonCount=1
AutoLogon=Yes
[GuiRunOnce]
Command0=C:\run_this_command.cmd
```

3.2 Adding support for different hardware types

The cloning profile that we created in the previous section is currently perfect for exactly one type of hardware, namely the one we used to create the master image.

With Tivoli Provisioning Manager for OS Deployment it is possible to use the same cloning profile for different types of hardware. During deployment, Tivoli Provisioning Manager for OS Deployment identifies the hardware and based on binding rules, the correct drivers are injected at the appropriate stage of the OS installation.

In this scenario we go through the steps for creating additional drivers, specify binding rules and installation sequences, so the cloning image can be used for different types of hardware requiring different drivers.

The steps for adding support for a new hardware type using an existing cloning profile are:

- Download the appropriate devce drivers for the new type of hardware
- Create device driver software packages for each new type of hardware
- Validate the correct binding rules exist for the new hardware

The process for adding support for new hardware types is illustrated in Figure 3-15.

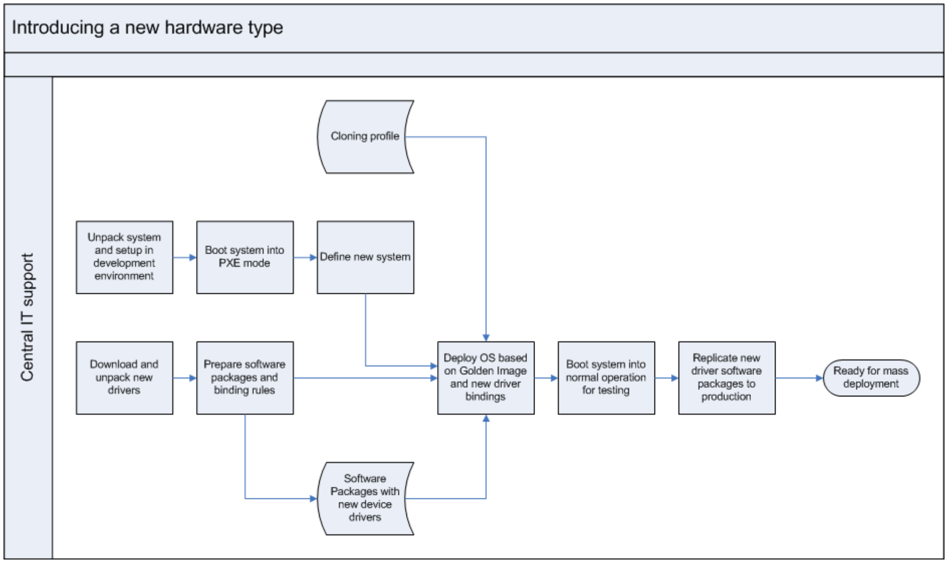

Introducing a new hardware type
Central IT support
Cloning profile
Unpack system and setup in development environment
Boot system into PXE mode
Define new system
Download and unpack new drivers
Prepare software packages and binding rules
Deploy OS based on Golden Image and new driver bindings
Boot system into normal operation for testing
Replicate new driver software packages to production
Ready for mass deployment
Software Packages with new device drivers

Figure 3-15 Process for adding support for new hardware types

The creation of device drivers is described in 2.3, “Adding drivers” on page 31 and will not be described further in this chapter.

3.2.1 The principle of device driver injection

In the point-of-sales environment the chances of having different types of hardware to deploy to is very high. In our case we had four different types of SurePOS systems each setup needed a different set of drivers. This section will go over the principle of device driver injection.

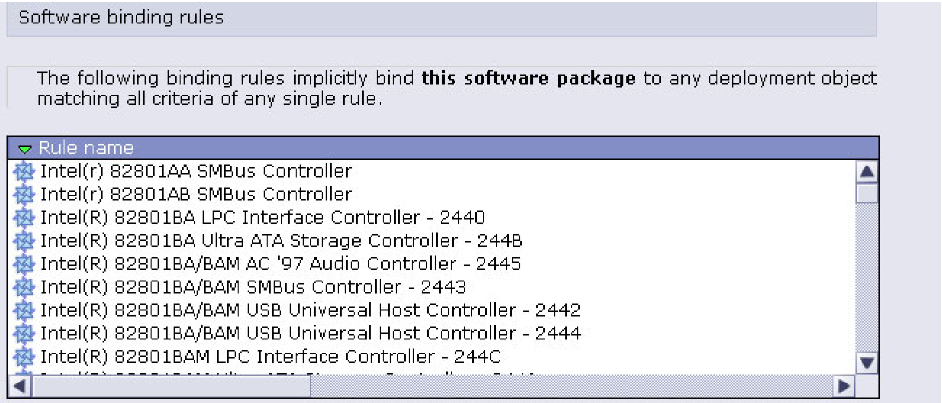
If a required device driver is not contained within the profile that is being deployed to a new target, then at best the hardware on the target will not be exploited, for example resulting in poor screen performance. At worst, the network cards will not initialize correctly, and the system will not have network access to correct the problem.

Instead of having the cloned machine image contain all the possible device drivers, Tivoli Provisioning Manager for OS Deployment adopts a different approach and allows to inject the required drivers into the image at deployment time. This means that you can always use the same image, and Tivoli Provisioning Manager for OS Deployment dynamically binds the hardware specific device driver to the deployment for your particular hardware. This process is accomplished through the uniquely set identifiers that exist on all PCI based devices.

This principle is described in full details in the IBM RedBook *Deployment Guide Series: Tivoli Provisioning Manager for OS Deployment V5.1*, SG24-7397.

3.2.2 Software Bindings

When a device driver software package is created, the binding rules are created automatically at the time of package creation as shown in Figure 3-16. Configuration and software bindings that are not the result of an automatic binding rule can be modified using the binding interface in the Host Monitor. Automatic binding rules are used to create bindings between configuration and hosts, or between software packages and hosts, without having to specifically bind a configuration or a software package to each host. Rules are created in configurations and software packages to determine which hosts will automatically be bound to the configuration or software package.



Software binding rules

The following binding rules implicitly bind **this software package** to any deployment object matching all criteria of any single rule.

Rule name
Intel(r) 82801AA SMBus Controller
Intel(r) 82801AB SMBus Controller
Intel(R) 82801BA LPC Interface Controller - 2440
Intel(R) 82801BA Ultra ATA Storage Controller - 244B
Intel(R) 82801BA/BAM AC '97 Audio Controller - 2445
Intel(R) 82801BA/BAM SMBus Controller - 2443
Intel(R) 82801BA/BAM USB Universal Host Controller - 2442
Intel(R) 82801BA/BAM USB Universal Host Controller - 2444
Intel(R) 82801BAM LPC Interface Controller - 244C

Figure 3-16 Device driver software package binding rules

Rules are made for criteria and values. If a host has a matching value for all criteria in the rule, the configuration or software package will be bound to the host. The binding will be displayed with the rule in the configuration panel of the host properities that match the criteria.

3.2.3 Deployment Scheme Parameter Wizard

Deployment schemes allow an administrator to create different deployment methods. For example, you can ensure that the deployment user must specify the hostname for each deployment. Deployment schemes are explained in section 2.4.1, “Creating a deployment scheme” on page 43.

3.3 Deploying the XP cloning profile

The deployment is the process of installing an operating system on a computer, and configuring the operating system on a given set of hardware, which in our case is IBM SurePOS system. In Tivoli Provisioning Manager for OS Deployment, a deployment is made of several steps that are executed in sequence without requiring user interaction.

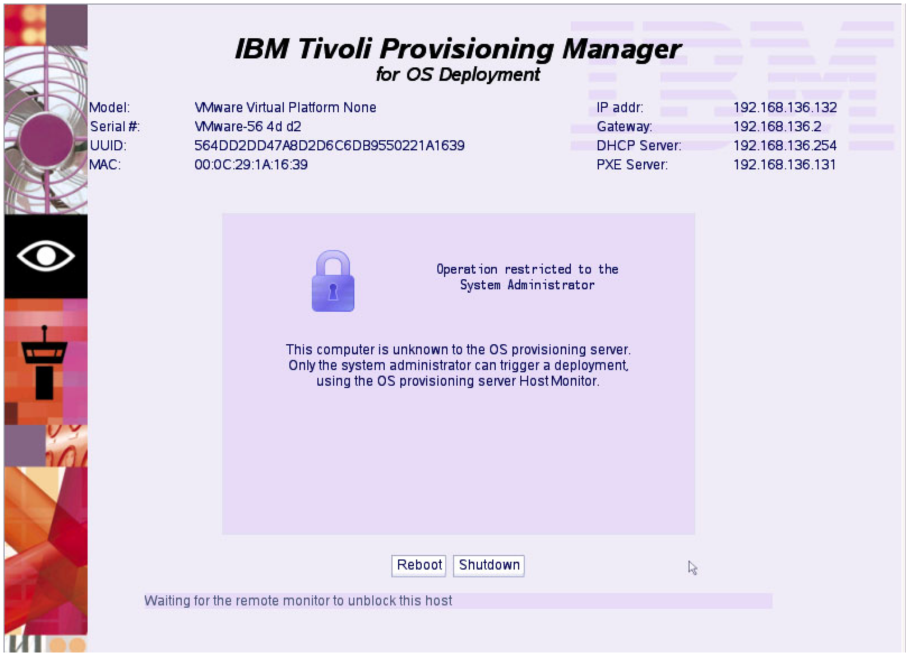
1. Partitions are created on the hard-disk, and then formatted according to information contained in the system profile to deploy.
2. All deployment objects (system profile, partition files and software packages) are downloaded in a temporary storage location on the hard-disk.

3. Operating system files are written in the hard-disk partitions, thus creating a bootable operating system with files and applications configured by database bindings between the host and software packages.
4. Host-specific configuration, like the hostname and the product key are gathered from the database to create a textual configuration file used by Microsoft's System Preparation Tool (sysprep) for Windows deployment.
5. The operating system is started, allowing sysprep to configure the operating system according to information stored in the Tivoli Provisioning Manager for OS Deployment database.
6. Tivoli Provisioning Manager for OS Deployment takes control again when sysprep has completed and rebooted the computer, in order to display a message indicating that the deployment was successful.

Deployment step by step

Now that we have captured an image, added applications, and added drivers, we are ready to deploy the Windows XP Image to a system that will be put into production after deployment:

1. Power on the SurePOS target machine. Assuming there is no operating system on the system (the hard drive is blank), you can simply let it boot up and it will try to boot the network as part of the regular boot sequence. If there is an operating system, force the system to boot from the network, as described in Appendix A, "Alternate boot sequence on POS systems" on page 133. Once the network boot has completed you should see a screen as shown in Figure 3-17 on page 74.



IBM Tivoli Provisioning Manager
for OS Deployment

Model:	VMware Virtual Platform None	IP addr:	192.168.136.132
Serial #:	VMware-56 4d d2	Gateway:	192.168.136.2
UUID:	564DD2DD47A8D2D6C6DB9550221A1639	DHCP Server:	192.168.136.254
MAC:	00:0C:29:1A:16:39	PXE Server:	192.168.136.131

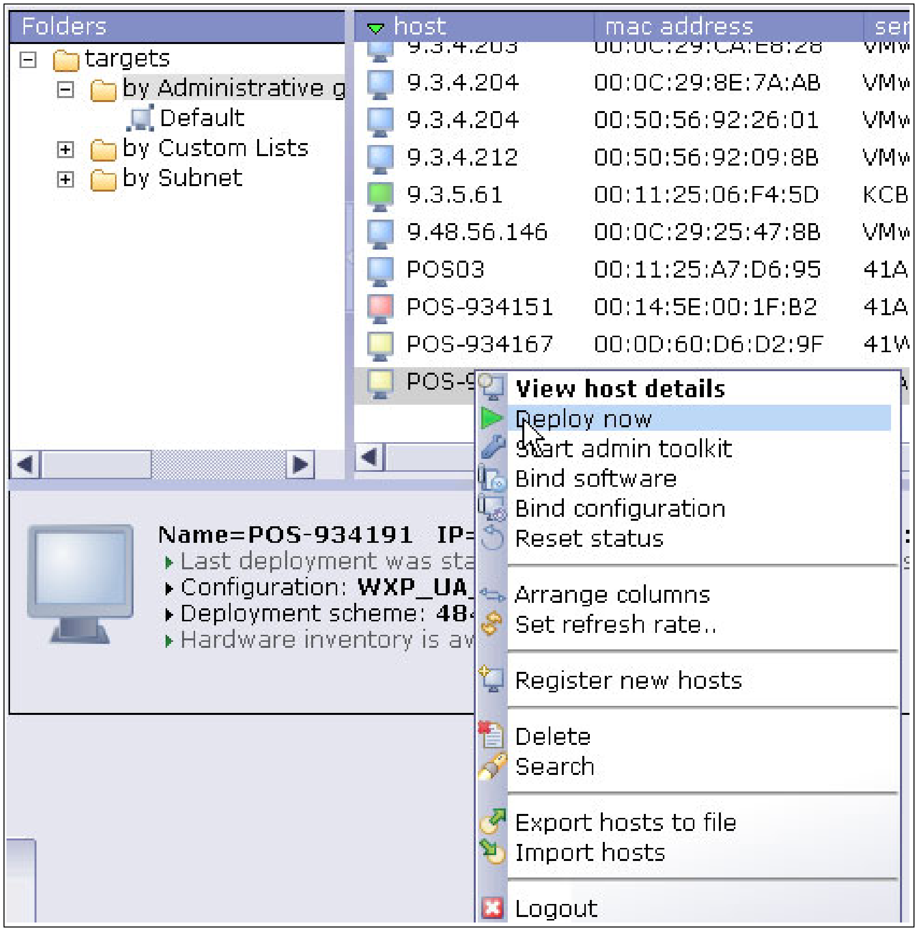
Operation restricted to the
System Administrator

This computer is unknown to the OS provisioning server.
Only the system administrator can trigger a deployment,
using the OS provisioning server Host Monitor.

Waiting for the remote monitor to unblock this host

Figure 3-17 A system booted from network and connected to TPMfOSD

2. After the client completes the network boot, return to the server console and select **Host Monitor** from the left margin to ensure that the system is discovered. Right-click on the newly discovered system and select **Deploy now** as shown in Figure 3-18 on page 75.

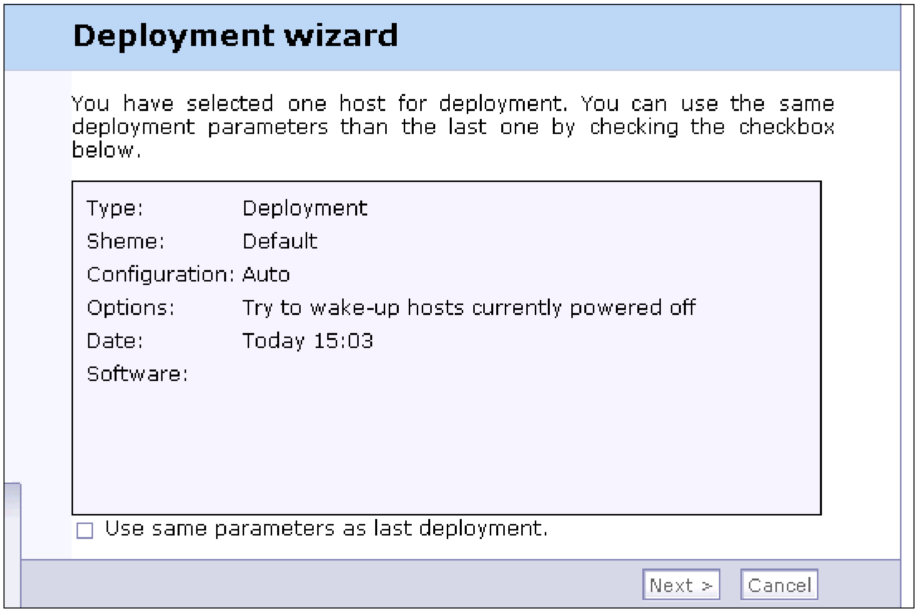


host	mac address	ser
9.3.4.203	00:0C:29:CA:E8:28	VMw
9.3.4.204	00:0C:29:8E:7A:AB	VMw
9.3.4.204	00:50:56:92:26:01	VMw
9.3.4.212	00:50:56:92:09:8B	VMw
9.3.5.61	00:11:25:06:F4:5D	KCB
9.48.56.146	00:0C:29:25:47:8B	VMw
POS03	00:11:25:A7:D6:95	41A
POS-934151	00:14:5E:00:1F:B2	41A
POS-934167	00:0D:60:D6:D2:9F	41W
POS-9		

Name=POS-934191 IP=
- Last deployment was sta
- Configuration: **WXP_UA_**
- Deployment scheme: **48**
- Hardware inventory is av

Figure 3-18 Selcting deploy now from the server console

3. The deployment wizard will be displayed as shown in Figure 3-19. Click **Next**.



Deployment wizard

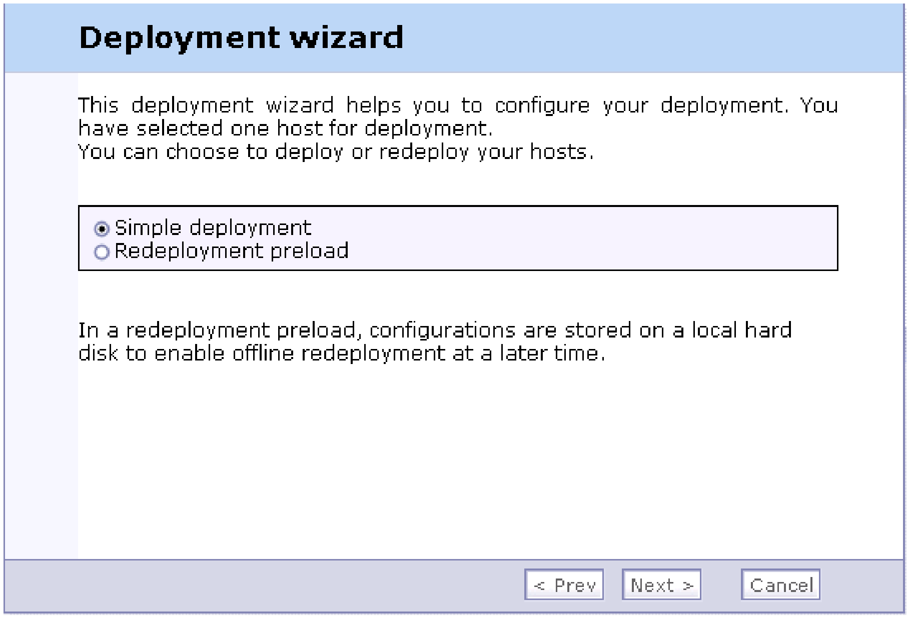
You have selected one host for deployment. You can use the same deployment parameters than the last one by checking the checkbox below.

Type:	Deployment
Sheme:	Default
Configuration:	Auto
Options:	Try to wake-up hosts currently powered off
Date:	Today 15:03
Software:	

□ Use same parameters as last deployment.

Figure 3-19 The deployment wizard

4. Next, keep the default option of Simple Deployment and click **Next** as shown in Figure 3-20 on page 77.



Deployment wizard

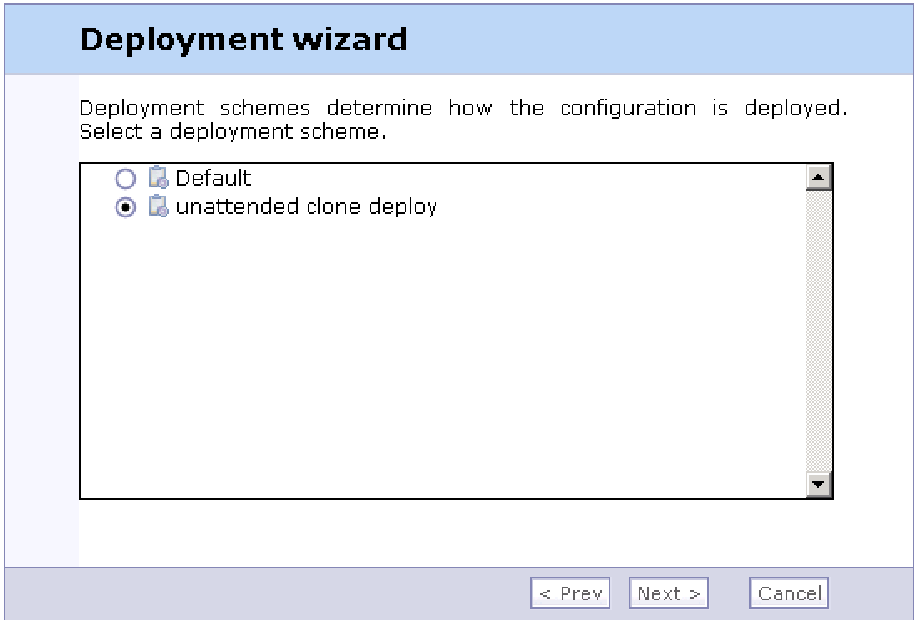
This deployment wizard helps you to configure your deployment. You have selected one host for deployment.
You can choose to deploy or redeploy your hosts.

● Simple deployment
○ Redeployment preload

In a redeployment preload, configurations are stored on a local hard disk to enable offline redeployment at a later time.

Figure 3-20 Selecting a simple deployment

5. Select the deployment scheme that was created earlier similar to the deployment scheme created for the unattended installation, but in this case for the clone. In this scenario the deployment scheme is called “Unattended clone profile”. We select the deployment scheme and click **Next** as shown in Figure 3-21.

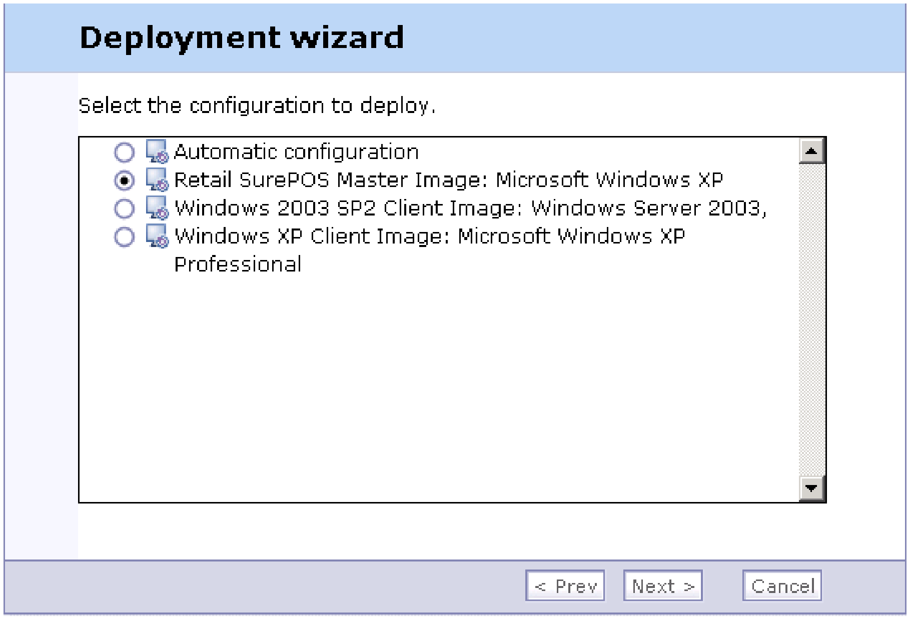


Deployment schemes determine how the configuration is deployed. Select a deployment scheme.

○ Default
● unattended clone deploy

Figure 3-21 Selecting the deployment scheme for cloning

6. Select the WinXP Image that we created in the previous section and click **Next** as shown in Figure 3-22 on page 79.



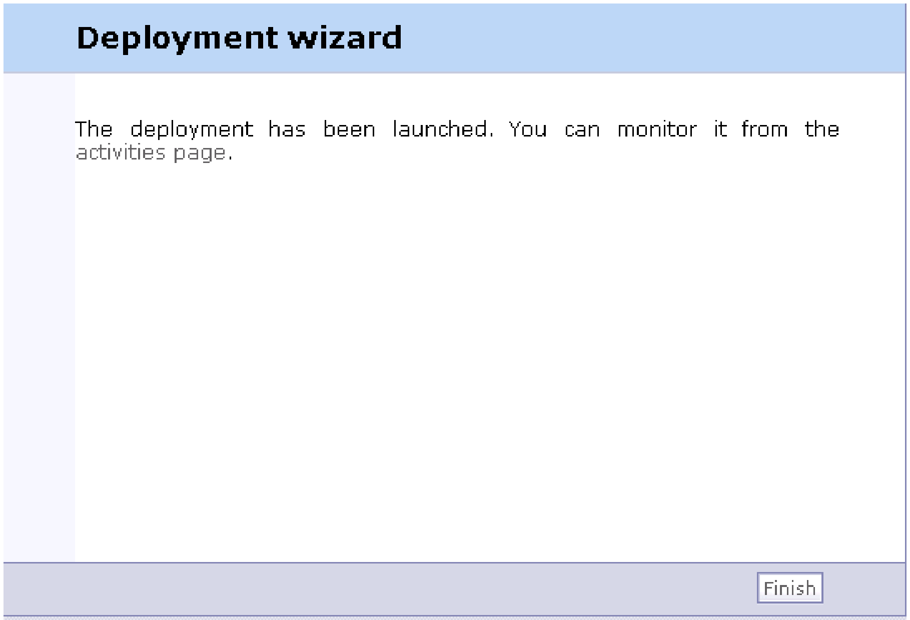
Deployment wizard

Select the configuration to deploy.

○ Automatic configuration
● Retail SurePOS Master Image: Microsoft Windows XP
○ Windows 2003 SP2 Client Image: Windows Server 2003,
○ Windows XP Client Image: Microsoft Windows XP Professional

Figure 3-22 Selecting the Windows XP configuration

7. Accept the remaining defaults and click Finish to Start the deployment as shown in Figure 3-23.

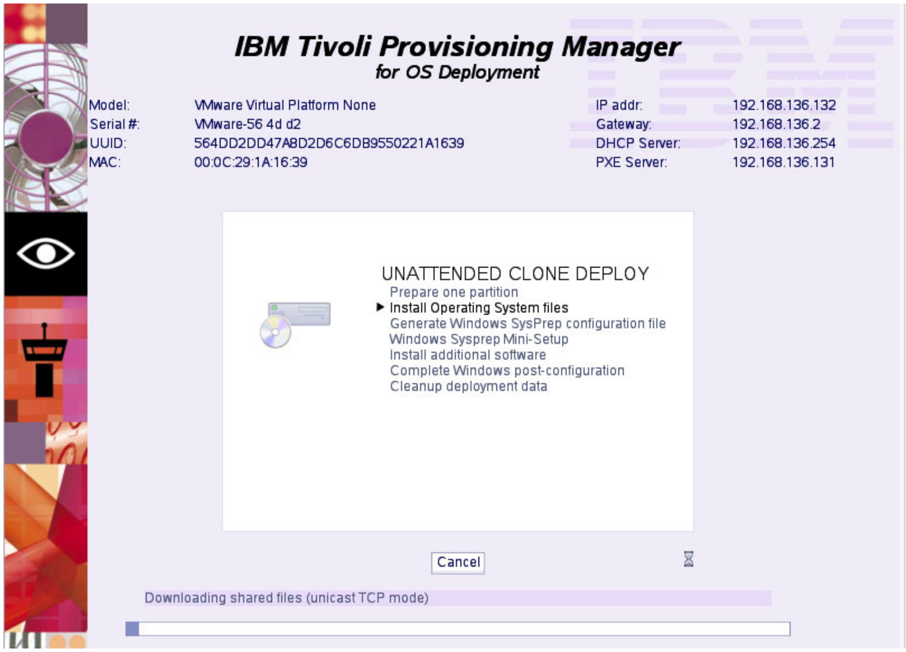


Deployment wizard

The deployment has been launched. You can monitor it from the activities page.

Figure 3-23 Finishing the deployment wizard

8. The deployment process will now begin on the target SurePOS machine. You should see an image in the target SurePOS system as shown in Figure 3-24 on page 81.



IBM Tivoli Provisioning Manager
for OS Deployment

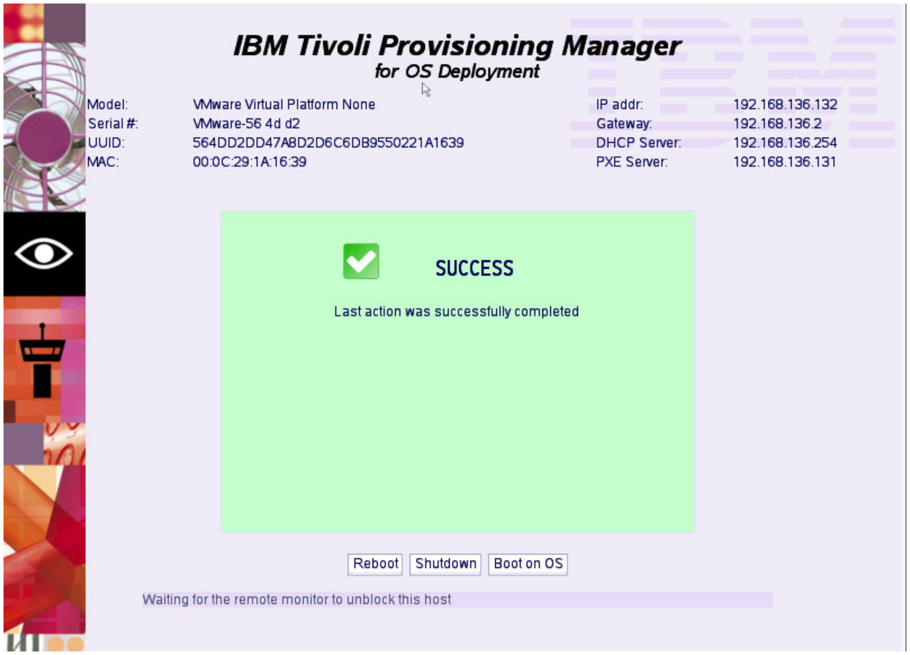
Model:	VMware Virtual Platform None	IP addr:	192.168.136.132
Serial #:	VMware-56 4d d2	Gateway:	192.168.136.2
UUID:	564DD2DD47A8D2D6C6DB9550221A1639	DHCP Server:	192.168.136.254
MAC:	00:0C:29:1A:16:39	PXE Server:	192.168.136.131

UNATTENDED CLONE DEPLOY
Prepare one partition
▸ Install Operating System files
Generate Windows SysPrep configuration file
Windows Sysprep Mini-Setup
Install additional software
Complete Windows post-configuration
Cleanup deployment data

Downloading shared files (unicast TCP mode)

Figure 3-24 deployment progress on the target during deployment

9. The system will execute several reboot cycles and you may notice that fundamental setup information will be automatically entered by the build process handled by Tivoli Provisioning Manager for OS Deployment. When the deployment is completed you should see a green banner on the target system indicating the deployment was successful as shown in Figure 3-25 on page 82.



IBM Tivoli Provisioning Manager
for OS Deployment

Model:	VMware Virtual Platform None	IP addr:	192.168.136.132
Serial #:	VMware-56 4d d2	Gateway:	192.168.136.2
UUID:	564DD2DD47A8D2D6C6DB9550221A1639	DHCP Server:	192.168.136.254
MAC:	00:0C:29:1A:16:39	PXE Server:	192.168.136.131

SUCCESS

Last action was successfully completed

Waiting for the remote monitor to unblock this host

Figure 3-25 Green banner on the target after successful deployment

With the above steps in this chapter, we have shown how to prepare and capture a cloning image from a master system, configure the profile, add additional drivers and finally deploy to a new target system.

4

Redeployment scenarios

Redeployment is the process of quickly reinstalling a system configuration previously installed by Tivoli Provisioning Manager for OS Deployment to its initial deployment state. There are two types of redeployments available. A server based imaging of the corrupted device by the same deployment scheme that was originally used to deploy the device or the use of a Tivoli Provisioning Manager for OS Deployment specific feature that is located on a local hidden partition of the device for recovery. This second redeployment feature of using a hidden partition to redeploy is especially useful for the retail environment since point-of-sale devices are used in a variety of locations that might not be easily accessible by central IT networks. This option gives local users or power users the ability to repair a corrupted device without the intervention of a central IT resources and brings business value by limiting the amount of downtime of the corrupt device. In this section we cover:

- The reasons for implementing the local redeployment feature
- Implementation and customization of local redeployment to a point-of-sale device
- Server based redeployment

4.1 Reasons for redeployment

We use the term redeployment for the situations where an existing POS system, that has already been deployed, in operation, and needs to be recovered to its original state as it was originally installed as a new system.

There are different reasons for redeployments, depending on the environment and the situation.

- After a hard drive failure

  This is probably the most obvious reason. If the hard drive fails it needs to be replaced with a new drive which then needs to be provided with operating system and software from the ground. Since the system itself is already known to Tivoli Provisioning Manager for OS Deployment, the redeployment process is very simple.

- After a software failure

  This scenario is a little less obvious. Normally the IT helpdesk will try to figure out what the actual problem is and try to resolve it. However, almost any software problem will take more than 15 minutes to resolve, which is enough to justify issuing a redeployment, which will effectively take around 20-25 minutes, assuming a local server. The redeployment process can be speeded further up by keeping a redeployment image locally on the system's hard drive in a hidden partition.

- Performance and stability

  It is common experience that a computer always works the best and the fastest on the day it is installed. At that time, the system is completely clean, free of any undesirable CPU-consuming gadgets, and all programs are configured for their optimal use by the system administrator. If the systems are subject to many changes from different end users, but ideally the system should be clean for the next user, it may be advisable to configure the system to automatically redeploy itself at every system boot.

The first two reasons are very valid in the POS environments and will be covered in this chapter. While the reasoning behind performance and stability are also valid, the typical use of a POS system does not include letting users do any customizations or even using the systems to other things than the POS application(s). This type of scenario is more relevant for workstations with public access, for example in libraries, hotel Internet cafés, schools and so forth.

4.2 Redeployment from the local hard drive

The most efficient method for redeploying is to implement the on-site deployment feature during the initial deployment. Using this feature will create a hidden partition on the target system with a copy of the deployed system.

Whenever the system is started, a boot menu is shown with a timeout value so if no selections are made, the system continues the normal boot of the installed operating system. If a redeployment is required, the normal boot process can be interrupted via the boot menu, and a redeployment can be issued.

The process for setting up a system with local redeployment enabled is shown in Figure 4-1 and includes the following steps:

- Create a deployment scheme that includes the redeployment feature.
- Run an initial deployment specifying to preload the operating system as opposed to normal deployment.
- Create a boot menu that will be used with the local redeployment feature.
- Run the redeployment using the deployment scheme and the customized GUI.

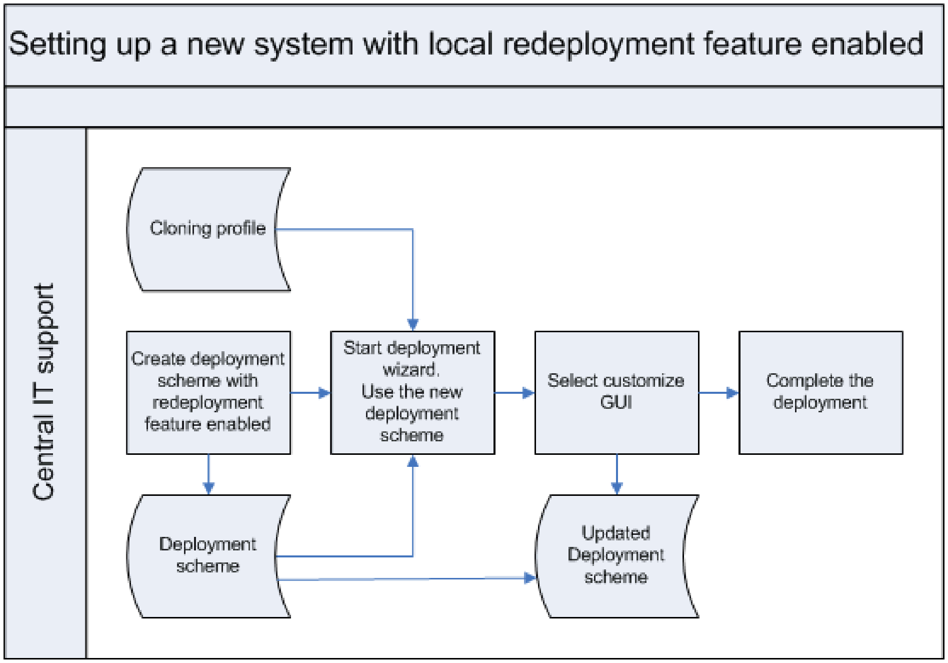

Setting up a new system with local redeployment feature enabled
Central IT support
Cloning profile
Create deployment scheme with redeployment feature enabled
Start deployment wizard. Use the new deployment scheme
Select customize GUI
Complete the deployment
Deployment scheme
Updated Deployment scheme

Figure 4-1 Process for setting up a system with local redeployment enabled

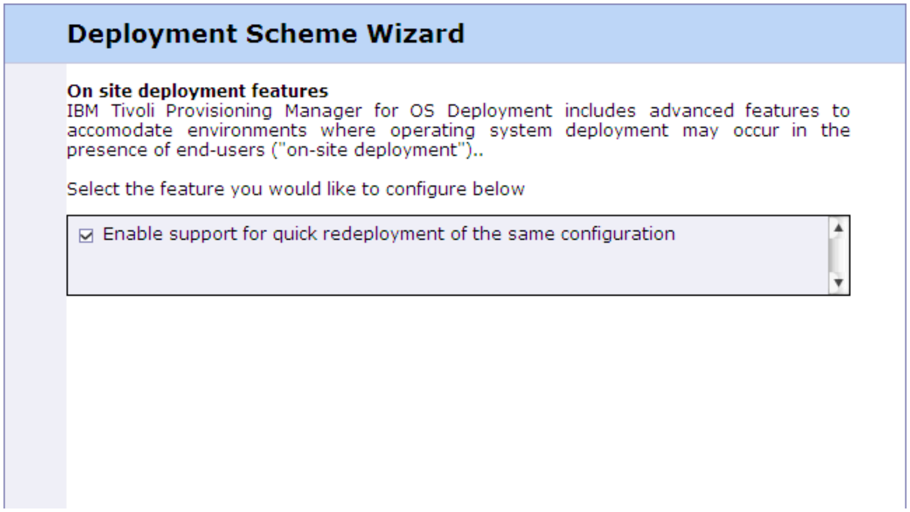
Using the local recovery is very efficient in terms of recovery time. However it must be noted that it will not help in the event of a hard drive failure, where the hidden partition will also be lost.

It is recommended that the profile is customized to enable redeployment on point-of-sale devices that are not connected to the central IT network through high speed networks or have configurations that are easily damaged by user error. This minimizes the amount of time required by a power user or field technican to repair the device and put it back in service. In most cases the user of the local redeployment feature will be a power user like a warehouse manager or a field technican tha is sent to repair the terminal.

4.2.1 Create a deployment scheme that supports redeployment

The first step in preparing for redeployment is to create a deployment scheme that has redeployment enabled. To create a deployment scheme that supports redeployment follow these steps:

1. To create a new deployment scheme, open the **OS Deployment** menu in the left panel and select **Task templates**. Then click the button **New Scheme**. This initiates the deployment scheme wizard. Start by giving the new deployment scheme a descriptive name, then click **next** and go through the panels and define deployment attributes as with any other deployment. When you reach the page for the On-site deployment features (Figure 4-2), select the support for quick redeployment.



Deployment Scheme Wizard

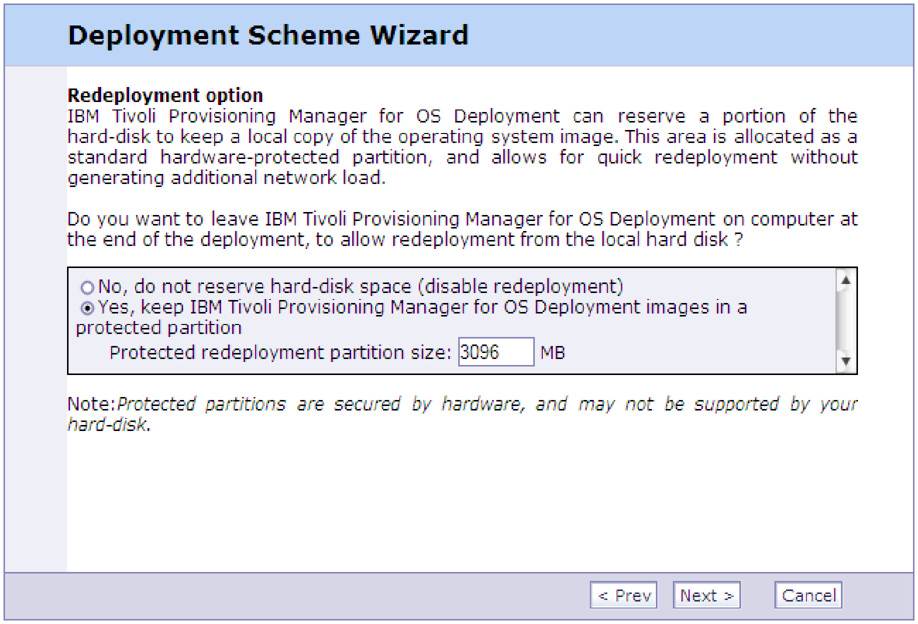
On site deployment features
IBM Tivoli Provisioning Manager for OS Deployment includes advanced features to accomodate environments where operating system deployment may occur in the presence of end-users ("on-site deployment")..

Select the feature you would like to configure below

☑ Enable support for quick redeployment of the same configuration

Figure 4-2 Enabling quick redeployment feature

2. On the next panel (Figure 4-3), select **Yes** to **keep Tivoli Provisioning Manager for OS Deployment images in a protected partition**, and enter the space that you want to allocate to this special partition. Enter a value at least as large as the total size of all system and software images to be deployed on the computer, as it will retain all these images. If you are unsure, start with approximately 800 MB for a Windows 2000 configuration, 1500 MB for a Windows XP configuration, or 1500 MB for a Linux configuration. If you want a more precise number, check the image sizes reported in a deployment log and round the sum up to accommodate the miscellaneous structures used for redeployment.



Deployment Scheme Wizard

Redeployment option

IBM Tivoli Provisioning Manager for OS Deployment can reserve a portion of the hard-disk to keep a local copy of the operating system image. This area is allocated as a standard hardware-protected partition, and allows for quick redeployment without generating additional network load.

Do you want to leave IBM Tivoli Provisioning Manager for OS Deployment on computer at the end of the deployment, to allow redeployment from the local hard disk ?

○ No, do not reserve hard-disk space (disable redeployment)
● Yes, keep IBM Tivoli Provisioning Manager for OS Deployment images in a protected partition
Protected redeployment partition size: 3096 MB

Note:*Protected partitions are secured by hardware, and may not be supported by your hard-disk.*

Figure 4-3 Set the redeployment partition size

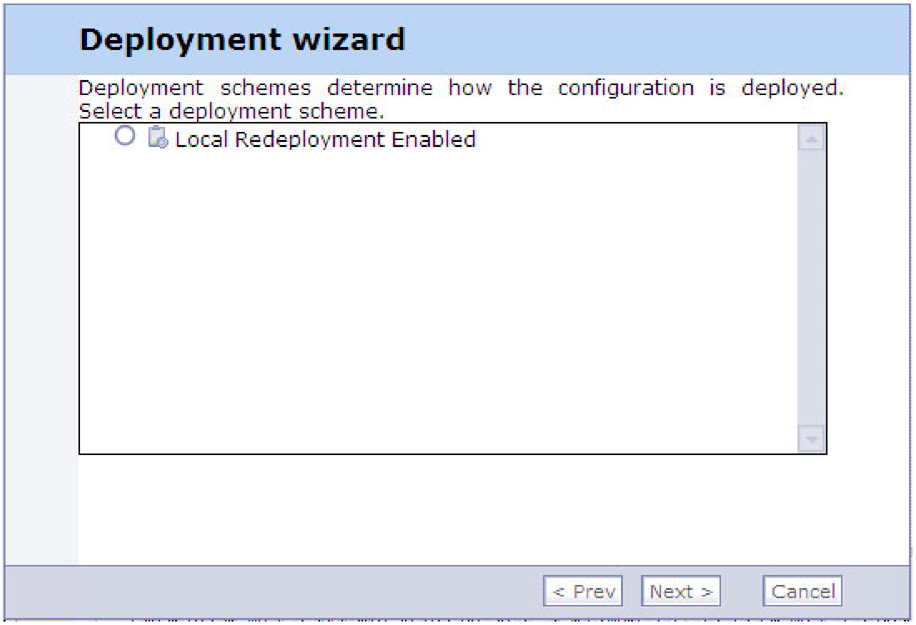
Note: The space that you allocate to the redeployment partition is literally subtracted from the hard-disk total capacity, as seen by Windows or Linux. It is not simply a hidden partition, but instead a hardware-protected area, as defined in ATA-5 specification. If necessary, you can recover this space simply by running another deployment operation that does not include redeployment.

3. Click **Next**, and then **Finish** to complete the customization process and obtain a deployment scheme ready for redeployment.

4.2.2 Create a boot menu

To create a new menu for the local POS system, follow these steps:

1. In the web console, open the **OS Deployment** menu in the left panel and select **Host Monitor**. Then right-click the host you want to deploy to and select **Deploy now.**
2. Go through the deployment wizard, but make sure to select **Redeployment preload** and not **Simple deployment**. This enables the option to use the deployment scheme we just created (Figure 4-4).



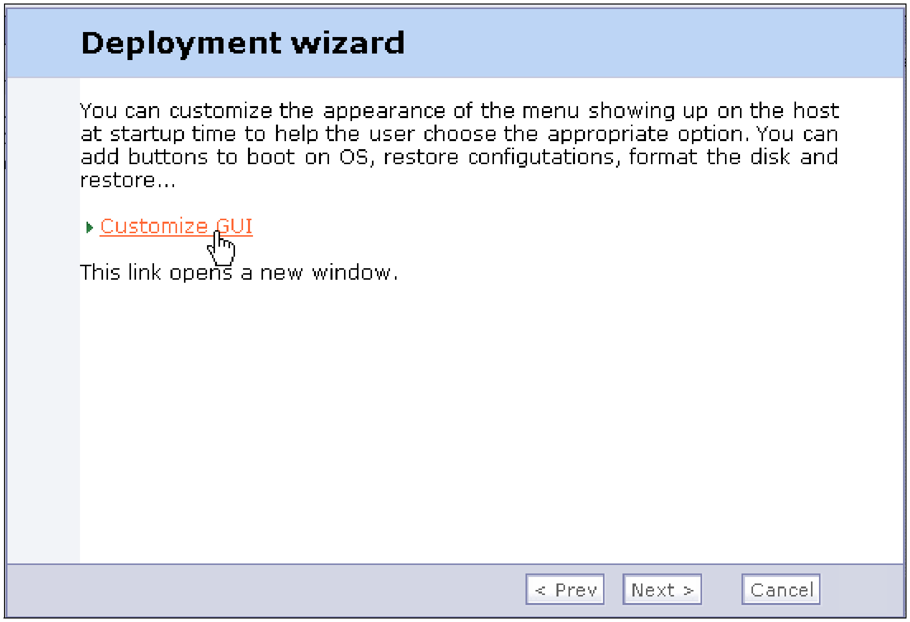
Deployment wizard

Deployment schemes determine how the configuration is deployed.
Select a deployment scheme.

○ Local Redeployment Enabled

Figure 4-4 Selecting the new deployment scheme for redeployment

3. Proceed through the wizard, selecting the profile and relevant software packages.
4. When the wizard comes to a page with an option to **Customize GUI** as shown in Figure 4-5 select this option. This opens a new window as shown in Figure 4-5.



Deployment wizard

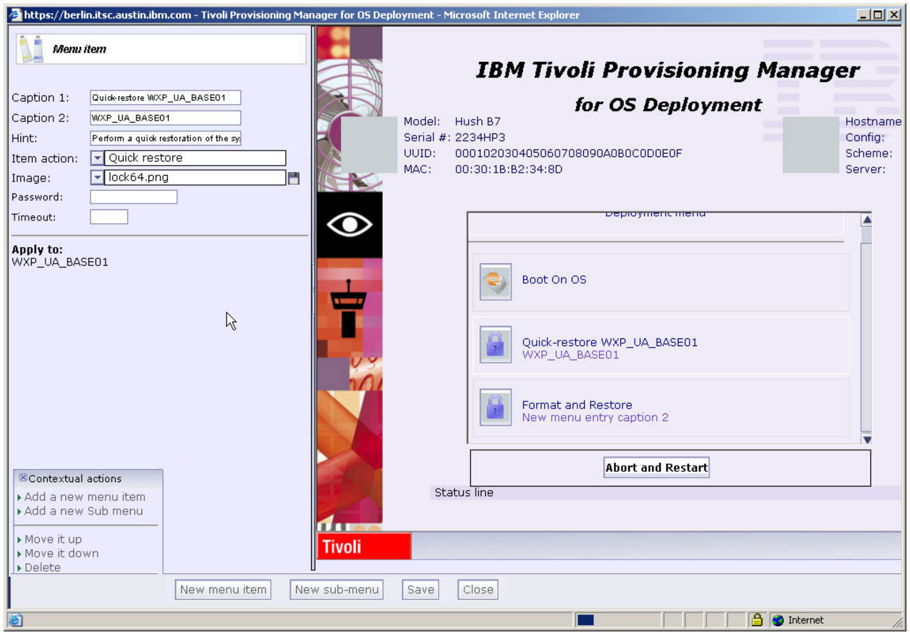
You can customize the appearance of the menu showing up on the host at startup time to help the user choose the appropriate option. You can add buttons to boot on OS, restore configutations, format the disk and restore...

This link opens a new window.

Figure 4-5 Launching the customization gui

5. After you get the GUI customization screen, you can add menu items, sub-menus, edit text displayed on these menus, time outs, passwords and so forth. In our example we create three menu items for the following:
   - Booting directly to disk (time out 3 seconds)
   - Redeployment using fast redeployment (password protected)
   - Redeployment using full format (password protected)

   Figure 4-6 shows how the redeployment GUI can easily be customized.



Caption 1: Quick-restore WXP_UA_BASE01
Caption 2: WXP_UA_BASE01
Hint: Perform a quick restoration of the sy
Item action: Quick restore
Image: lock64.png
Password:
Timeout:

Apply to:
WXP_UA_BASE01

Model: Hush B7
Serial #: 2234HP3
UUID: 000102030405060708090A0B0C0D0E0F
MAC: 00:30:1B:B2:34:8D

Hostname
Config:
Scheme:
Server:

Figure 4-6 Customizing the redeployment GUI

In Figure 4-6, you can see three entries:

- The first entry uses **Boot on OS** item action and has a time out value set to three. This is the default action if no other menu item was selected, and it will cause the machine to boot to the operating system installed on the hard disk.
- The second option is used for quick redeployment. Its item action is set to **Quick restore**, and the password is set. This menu item aims to fix changed/deleted/added files without touching unchanged files. The icon was changed from Default to lock64.jpg.
- The third menu item does a full format of the disk and then restores all files. This requires more time than the second option. Its item action is set to **Format and Restore**, and the password is set. The icon was changed from Default to lock64.jpg.

6. After you finish the GUI customizations, save the changes. The changes are bound to the configuration.
7. If you want to proceed with the deployment of this profile click the **Ok** button; otherwise, click **Cancel**.

Every time the system is started, it presents a menu with three entries. If none are selected, the system automatically boots to disk after three seconds. If one of the other options is selected, the user is requested to provide a password. If the password is correct, the operating system partition is redeployed, and the user data on the second partition will not be touched.

4.2.3 Process for local redeployment

The process for recovery after a software error, using the local redeployment, is shown in Figure 4-7. As can be seen, it is effectively a self-service, there is no need for Central IT to get involved.

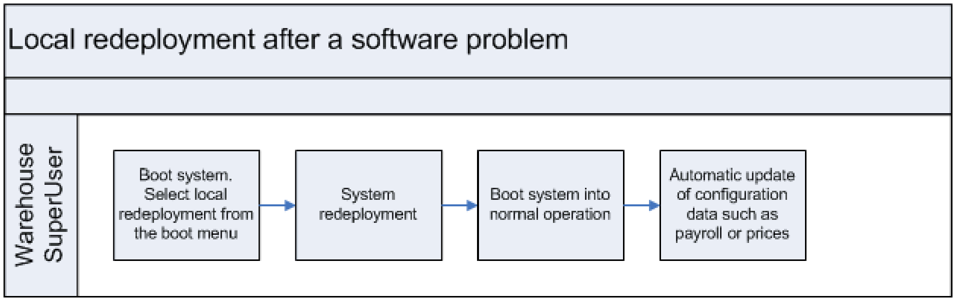

Local redeployment after a software problem
Warehouse SuperUser
Boot system. Select local redeployment from the boot menu
System redeployment
Boot system into normal operation
Automatic update of configuration data such as payroll or prices

Figure 4-7 Process for local redeployment

Central IT is able to contribute to the redeployment process if the point-of-sale device has remote control capabilities though an ethernet KVM. However, in most cases the local redeployment is utilized by a power user or a field technician dispatched from central IT.

4.3 Redeployment from the server

Redeployment from the server involves re-running the same deployment scheme to the device. In the case of server redeployment you are leveraging the inventory and other database information that is stored about the device on the Tivoli Provisioning Manager for OS Deployment server that is captured at the time the machine was originally deployed. This information can then be reused to redeploy the same configuration to the same device. This is different from local redeployment which uses the local information in the hidden partition rather than the server database information.

It is recommended that local and server redeployment be used as part of a combined strategy to repair a device. A local redeployment should be used when possible; however, if a hardware failure cause the need for a server based redeployment the data in the Tivoli Provisioning Manager for OS Deployment database should be leveraged to ensure the device is restored.

The process for recovery after a disk failure is shown in Figure 4-8.

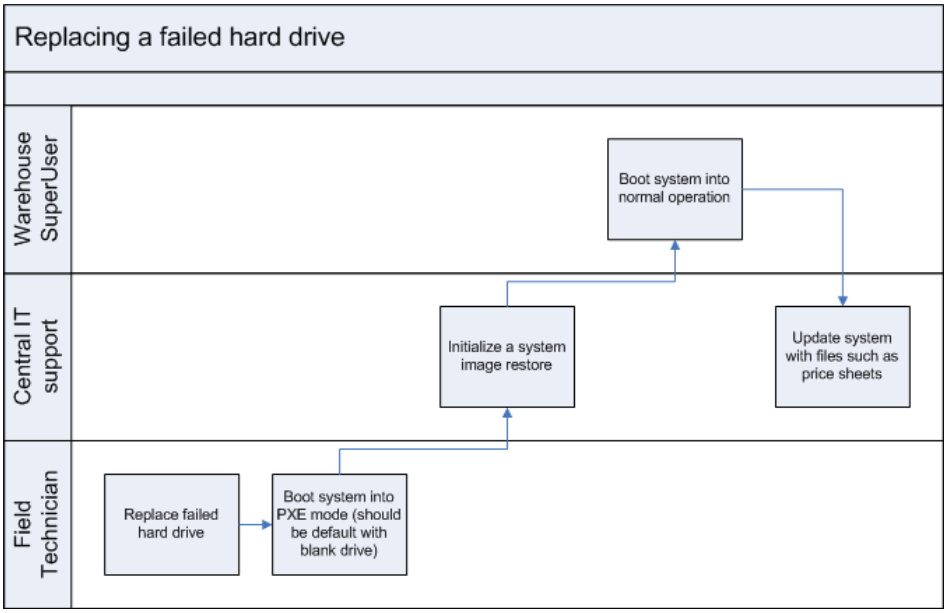

Replacing a failed hard drive
Warehouse SuperUser
Central IT support
Field Technician
Boot system into normal operation
Initialize a system image restore
Update system with files such as price sheets
Replace failed hard drive
Boot system into PXE mode (should be default with blank drive)

Figure 4-8 Process for redeployment after a failed hard drive

The major difference between a server redeployment and simply doing a new deployment from a clone is the options that are selected at the time the “**Deploy Now**” function is launched. By using the server redeployment feature, the configuration will have the exact same settings as the original distribution. When issuing a new deployment there is a risk that one or more settings are different.

4.3.1 Redeployment Process

Tivoli Provisioning Manager for OS Deployment addresses the challenge of redeployment with the following steps:

1. At the end of the deployment, Tivoli Provisioning Manager for OS Deployment creates a reference image of the computer, and saves it into a protected redeployment partition (invisible to the user and to the operating system itself). This only adds a minute or so to the deployment process, as most of the files are already present as file archives on the disk at that time.
2. Every time a computer starts, Tivoli Provisioning Manager for OS Deployment hooks the boot process before the operating system starts (using PXE or using a special Master Boot Record).

3. If configured to do so, Tivoli Provisioning Manager for OS Deployment authenticates the user of the computer against the server database, to restrict the use or the maintenance of the computer to authorized persons.
4. If configured to do so, Tivoli Provisioning Manager for OS Deployment offers the choice of several configurations available on the computer (multiboot), and of several levels of cleaning.
5. Using the reference image saved during deployment, Tivoli Provisioning Manager for OS Deployment resynchronizes the hard-disk content to its reference state. This usually takes a few seconds in the normal case, and can take up to a few minutes if everything has been destroyed on hard disk by the previous user.

The local redeployment is very versatile. The redeployment can be fully automated and mandatory, or it can be based on a menu with for example a five-seconds timeout, after which the existing system will start up without any redeployments. Redeployments can also be protected by a user-authentication mechanism, thereby limiting the access to authorized persons.

5

System image snapshots

In this chapter we introduce the point-of-sale (POS) plug-in for Tivoli Provisioning Manager for OS Deployment. and describe its essential functionality. Using the deployment environment outlined in previous chapters as our starting point, we describe and demonstrate the procedure for installing the plug-in.

We introduce each of the capabilities provided by the plug-in, discuss each one's usefulness for provisioning IBM POS terminals and demonstrate how we used it in our mock production environment.

5.1 Introducing the POS plug-in

Previous chapters described factors that differentiate the management of POS terminals in a retail environment from those generally applicable to computer systems in offices, laboratories, schools and many other settings. However, the IBM POS systems we have been working with in this paper are very similar in most respects, to standard office PCs. The hard disks, CPUs, printer ports, memory chips, USB ports, etc. are, in most cases, identical and interchangeable.

Likewise, these terminals run standard versions of Microsoft Windows® XP Professional as well as some other common operating systems that are outside of our scope. Indeed, we used the very same media to create our POS operating system images, that are used for server and desktop OS installs.

The main hardware differences between POS terminals and desktop PCs are the additional I/O devices that POS terminals are designed to interact with. These include things like cash drawers, touch screens, customer displays and operator proximity sensors. Some of these devices - such as magnetic card readers - are built-in but many others are connected to the terminals using the same standard interface technologies, like the Universal Serial Bus (USB) for example, as their office based counterparts.

This means that Tivoli Provisioning Manager for Operating System Deployment, with its rich set of features and capabilities, is ideally suited to managing POS devices even without the POS plug-in. The question then is: what value does the plug-in add?

There are two major capabilities available after installing the POS plug-in.

- Backup/Restore the current state of a machine.
- Perform a “Hardware Switch” of an ailing POS terminal with an identical machine.

The POS backup function makes it easy to accurately capture complete backups of the operating system, programs, data, device drivers and software settings of a POS terminal at a specific point in time. *This includes any dynamic data that may have been created or changed since the POS was originally deployed.*

Note: CMOS/BIOS settings are not captured by the POS backup function.

The hardware switch function facilitates the process of quickly replacing an ailing POS terminal device with new hardware, by allowing an administrator to restore backups that were originally created from the old hardware, onto the new.

With these two core features and a couple of other helpful utilities the POS plug-in bridges the gap between initial POS terminal deployment/redeployment, and management of POS on a “steady state” basis.

5.2 Installing the POS plug-in

Installing the plug-in is quite easy, requiring only three simple steps:

- Stop the Tivoli Provisioning Manager for OS Deployment server service.
- Copy the POS plug-in module into the Tivoli Provisioning Manager for OS Deployment packages directory.
- Restart the server service.

The Tivoli Provisioning Manager for OS Deployment server service is called “Rembo Server”. The plug-in file is called “pos.pak”

The POS plug-in can be installed from the Windows graphical interface (GUI) or from a command prompt. We installed the plug-in on our “production” server (NICE) using the Windows GUI. We used the command line to install it on our “development and test” server (BERLIN).

.

> **Note:** You must be logged in to Windows as a member of the administrators group in order to install the POS plug-in.

The POS plug-in requires Tivoli Provisioning Manager for OS Deployment Fixpack 3 to be applied.

5.2.1 Obtaining the POS package

The POS plug-in module is available to IBM customers who are using Tivoli Provisioning Manager for Operating System Deployment. At the time of this writing, the distribution channel for the POS module has not yet been determined. Readers are encouraged to check IBM’s web site or contact their IBM service representative to obtain the latest version. General information about IBM POS terminals is available on IBM’s web site at:

`http://www.ibm.com/products/retail/?cm_re=masthead-_-products-_-pos`

5.2.2 Installing the POS plug-in from the Windows GUI

We performed the steps below using the Windows graphical desktop to install the POS plug-in on NICE.

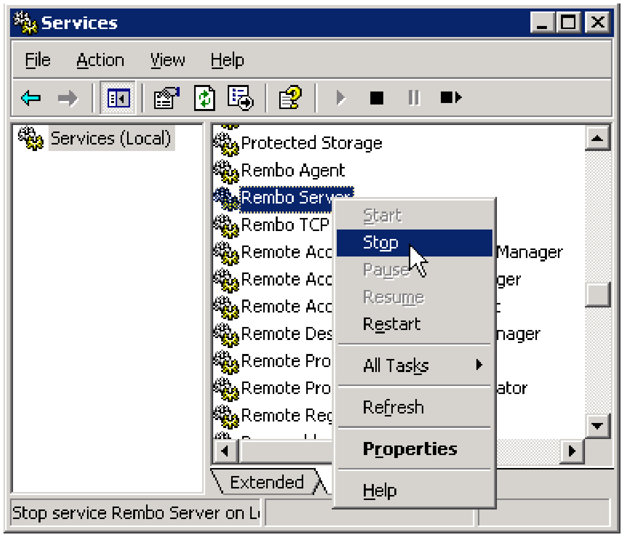
Stop the Rembo server service (GUI)

To stop the service, first login to the server as an administrator and perform the following steps as shown in Figure 5-1 on page 98.

1. Open the windows Services dialog by clicking:

   Start → **Control Panel** → **Administrative Tools** → **Services**

2. Stop the service by right clicking **Rembo Server** in the list of services and selecting **Stop**.
3. Minimize, but do not close the Services dialog.



Stop service Rembo Server on L

Figure 5-1 topping the Rembo Server service from the GUI

Copy the POS plug-in module to the packages directory (GUI)

To copy the POS plug-in module into the Tivoli Provisioning Manager for OS Deployment executable folder perform the following steps as shown in Figure 5-2 on page 99.

1. Open the temporary folder containing the plug-in file, `pos.pak`, by clicking:

   Start → **My Computer**

   and entering the pathname of the your temporary folder in the address bar.

> **Note:** In our test environment the temporary folder location was:
>
> ```
> C:\tmp
> ```

2. Open the Tivoli Provisioning Manager for OS Deployment packages folder by clicking:

   Start → My Computer

   and entering the pathname of the folder in the address bar.

> **Note:** In our test environment the packages folder location was:
>
> ```
> C:\Program Files\Common Files\IBM Tivoli\packages
> ```

3. Copy the `pos.pak` file by dragging it from the temporary folder to the `packages` folder while holding down the **Ctrl** key.

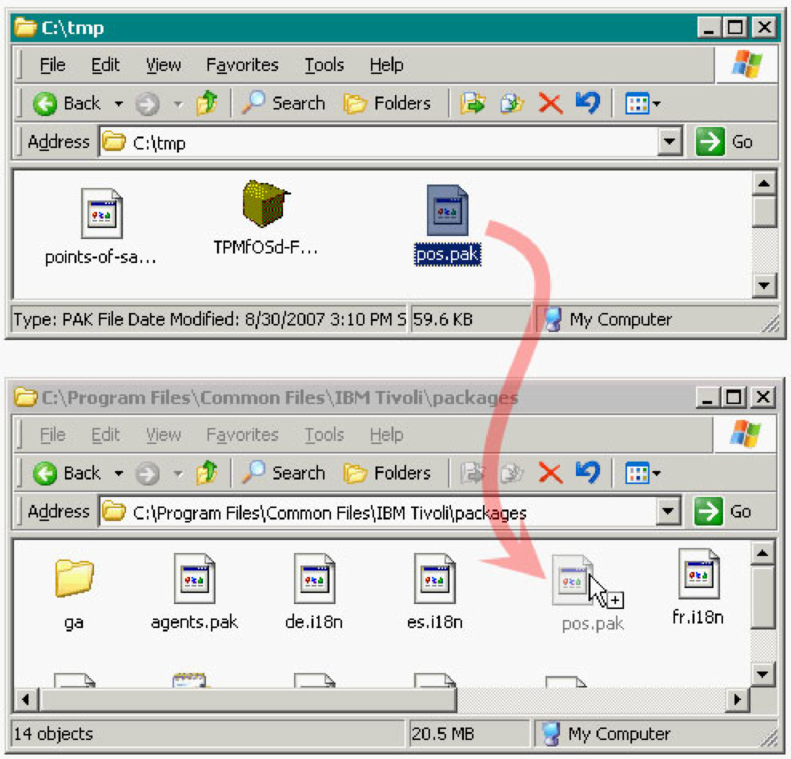

C:\tmp
File Edit View Favorites Tools Help
Back Search Folders
Address C:\tmp Go
points-of-sa...
TPMfOSd-F...
pos.pak
Type: PAK File Date Modified: 8/30/2007 3:10 PM S 59.6 KB
My Computer
C:\Program Files\Common Files\IBM Tivoli\packages
File Edit View Favorites Tools Help
Back Search Folders
Address C:\Program Files\Common Files\IBM Tivoli\packages Go
ga
agents.pak
de.i18n
es.i18n
pos.pak
fr.i18n
14 objects
20.5 MB
My Computer

Figure 5-2 Copying the pos.pak file

Restart the Rembo Server service (GUI)

Restart the server by right clicking **Rembo Server** in the **Services** dialog again if necessary (as in, “Stop the Rembo server service (GUI)” on page 98) and selecting **Start**.

5.2.3 Installing the POS plug-in from the command line

We performed the steps below using the windows command prompt to install the POS plug-in on BERLIN.

Stop the Rembo server service (CMD)

To stop the service, first login to the server as an administrator and then perform the following steps as shown in Figure 5-3.

1. Open a windows command prompt by clicking:

   Start → Run

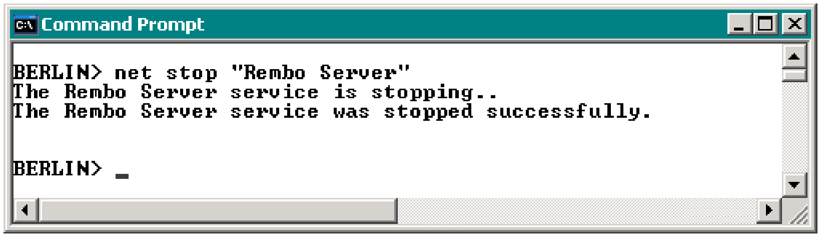
   then typing:

   `cmd`

   and pressing **`Enter`**.

2. At the command prompt enter:

   ```
   net stop "Rembo Server
   ```



```
BERLIN> net stop "Rembo Server"
The Rembo Server service is stopping..
The Rembo Server service was stopped successfully.


BERLIN> _
```

Figure 5-3 Stopping the Rembo Server service from the command line

Copy the POS plug-in module to the packages directory (CMD)

To copy the POS plug-in module into the Tivoli Provisioning Manager for OS Deployment executable directory perform the following steps from the command prompt as shown in Figure 5-4 on page 101.

1. At the command prompt type:

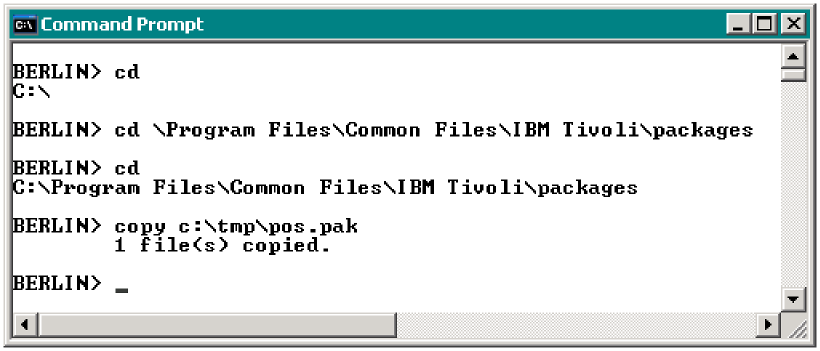
   ```
   cd <package folder path>
   ```

   and press **Enter**.

2. Copy the plug-in package file by typing:

```
copy <temporary folder path>\pos.pak
```

and pressing **Enter**.



```
BERLIN> cd
C:\

BERLIN> cd \Program Files\Common Files\IBM Tivoli\packages

BERLIN> cd
C:\Program Files\Common Files\IBM Tivoli\packages

BERLIN> copy c:\tmp\pos.pak
        1 file(s) copied.

BERLIN> _
```

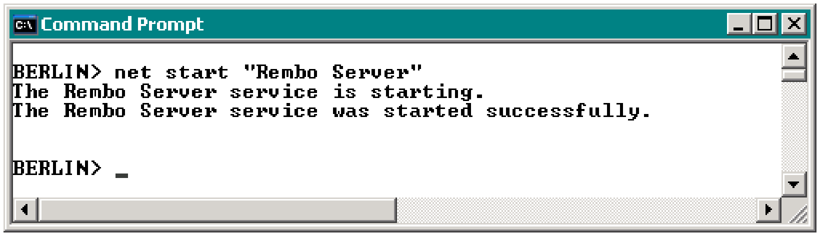
Figure 5-4 Copying the pos.pak file

Restart the Rembo Server service (CMD)

Restart the server as shown in Figure 5-5, by typing:

```
net start "Rembo Server"
```

and pressing **Enter**.



```
BERLIN> net start "Rembo Server"
The Rembo Server service is starting.
The Rembo Server service was started successfully.


BERLIN> _
```

Figure 5-5 Starting the Rembo Server service

5.2.4 Verifying the POS plug-in installation

Once the POS module has been installed, and the server service restarted, you can easily verify that the new functions are available by logging in using the web console.

First, open a web browser and navigate to the Tivoli Provisioning Manager for OS Deployment login page. The easiest way to do this from the server, is to click:

Start → All Programs → IBM Tivoli Provisioning Manager → Web Console

After entering your login credentials you will be presented with the Tivoli Provisioning Manager for OS Deployment console similar as usual, but with the "POS" section added (Figure 5-6 on page 102.)

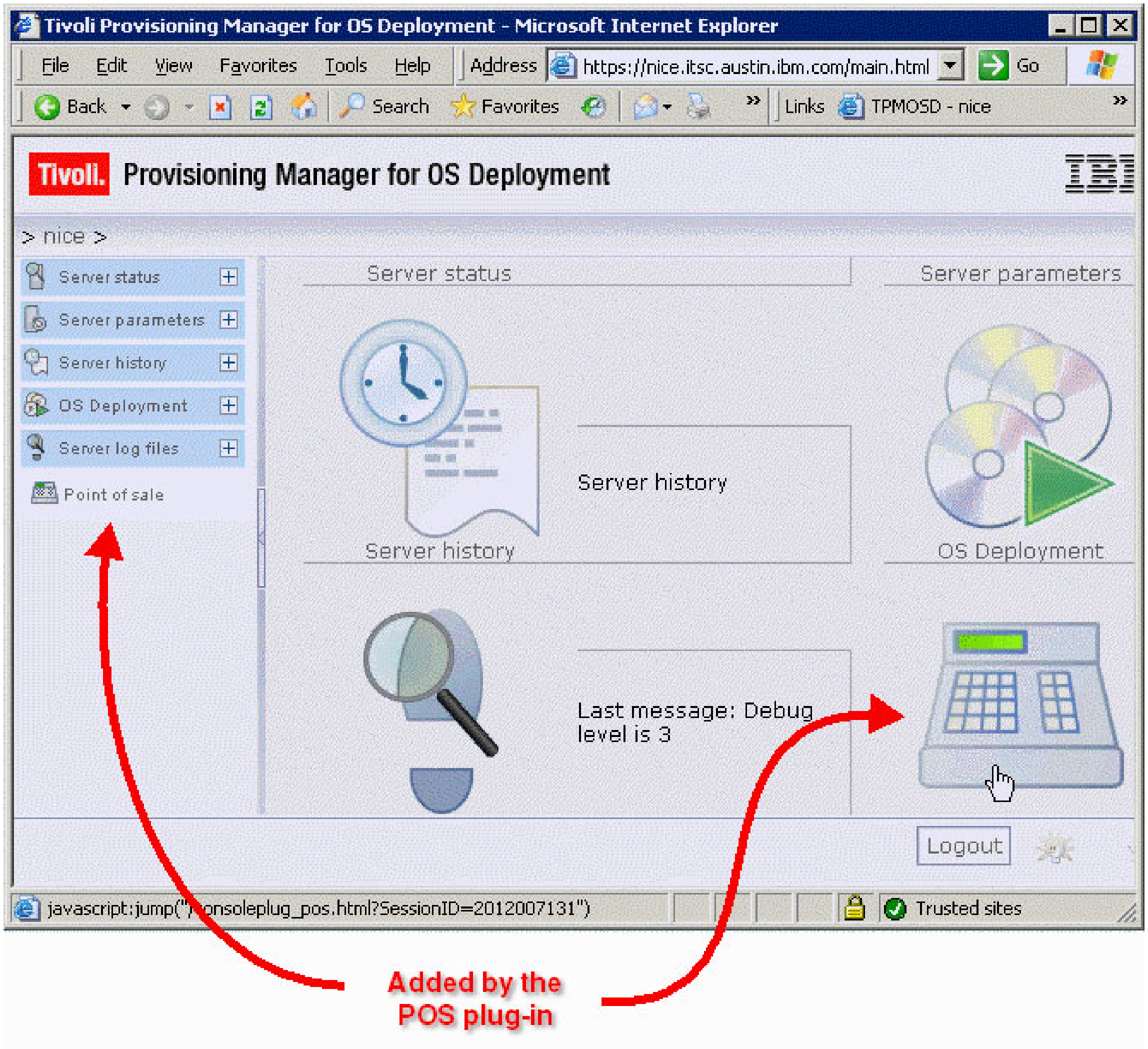
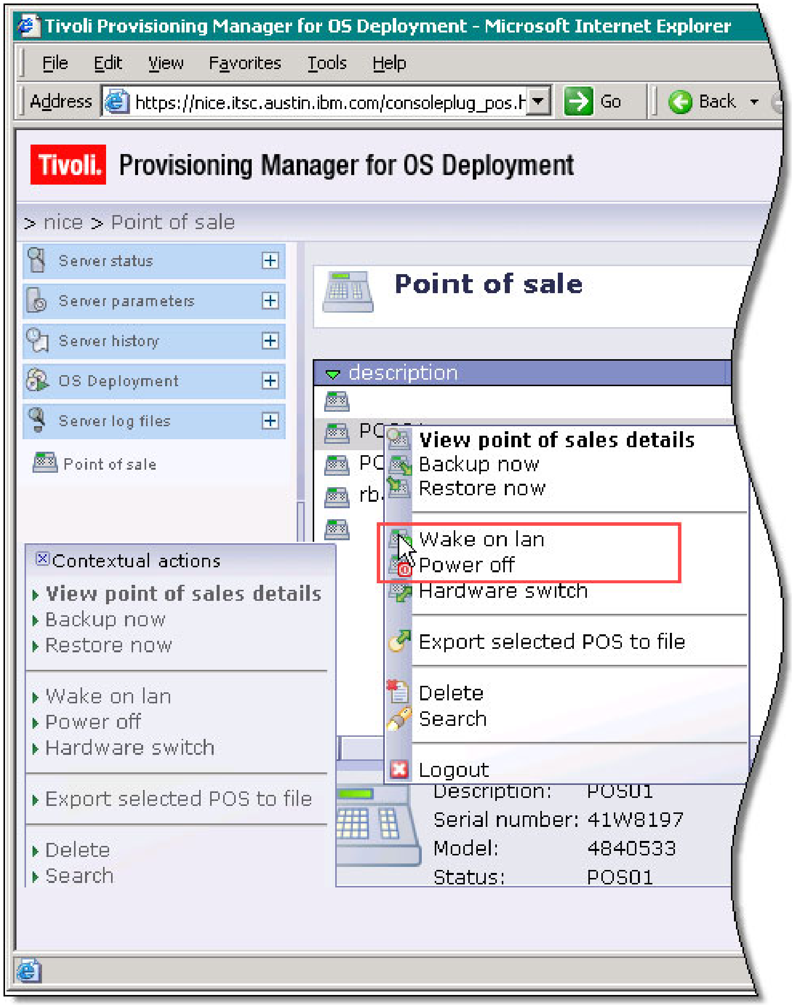


Figure 5-6 The web console with POS plug-in added

5.3 Remotely controlling POS terminals

The POS plug-in provides two useful functions (Figure 5-7 on page 103) for controlling POS terminals remotely. These can be accessed from the context menu, which is displayed when the user right-clicks on the POS terminal's entry in the POS list.


Tivoli Provisioning Manager for OS Deployment - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address https://nice.itsc.austin.ibm.com/consoleplug_pos.h
Go
Back
Tivoli. Provisioning Manager for OS Deployment
> nice > Point of sale
Server status
Server parameters
Server history
OS Deployment
Server log files
Point of sale
Point of sale
description
Contextual actions
View point of sales details
Backup now
Restore now
Wake on lan
Power off
Hardware switch
Export selected POS to file
Delete
Search
View point of sales details
Backup now
Restore now
Wake on lan
Power off
Hardware switch
Export selected POS to file
Delete
Search
Logout

Description: POS01
Serial number: 41W8197
Model: 4840533
Status: POS01

Figure 5-7 Context menu for POS devices

5.3.1 Wake on LAN

Selecting this option causes a Wake on LAN (WOL) “magic packet” to be sent to the terminal causing it to power up and beging the boot process. If the terminal is already running then the packet has no effect.

> **Note:** WOL support may also need to be enabled in the POS terminal’s BIOS to support this function.

5.3.2 Power off

If a POS device is booted into PXE mode, then this function can be used to turn it off. This can be used in conjuction with the Wake on LAN function to reboot the machine.

5.4 Creating Backups

Chapters 2-4 discussed in detail the processes for creating and installing initial software loads for POS terminals when they are initially deployed or redeployed. The information in those chapters is mainly concerned with getting “bare metal” machines into the “ready to use” state.

The backup facility added by the POS plug-in on the other hand, is useful for periodically capturing the state of a POS terminal - which may differ from when it was first put into service - so that it can be restored to that state should it experience some sort of malfunction. The key difference here is that the POS backup operation is optimized for speed, not for general applicability and a backup produced by it is only intended to be restored on the single POS terminal against which it was taken.

> **Note:** See section 5.5, “Switching hardware” on page 118 for an exception that applies when replacing an entire POS terminal in the field with an identical unit.

The POS backup function is therefore very useful for capturing dynamic data, configuration changes and so forth, that occur after a POS device is first deployed. If used regularly it provides the capability to restore a terminal to a state that is very near, if not identical, to when a malfunction first occurred.

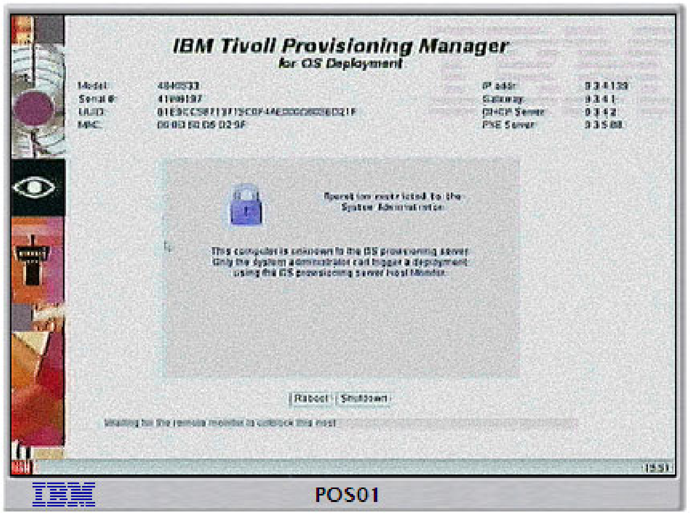
Indeed, in cases where a virus or a software misconfiguration has caused the system to fail, the most recent POS backup might actually be more accurate than is desirable, since it might have captured the state of the machine after the infection or misconfiguration occurred. However, since the POS plug-in allows multiple backups to exist at the same time, and allows them to be restored in any order, it is possible to go back to a point prior to the advent of the problem providing that enough backups have been retained.

5.4.1 Performing a POS terminal backup

POS backups are not interdependent and it is not necessary to retain a “full” backup to be used in conjunction with later “incremental” backups. Nevertheless, it is good practice to perform an initial POS backup immediately after the machine is first deployed. This will provide at least one known good restore point which can be retained indefinitely and used to restore the machine if subsequent backups have all been tainted by a problematic change.

In our lab environment we performed the following steps to create a POS backup of POS01, from our production server (NICE).

1. Boot the POS terminal into PXE mode from the LAN (Figure 5-8).



IBM Tivoli Provisioning Manager
for OS Deployment

Model: [illegible]
Serial #: [illegible]
UUID: [illegible]
MAC: [illegible]

IP addr: [illegible]
Gateway: 9.3.4.1
DHCP Server: 9.3.4.2
PXE Server: 9.3.5.88

Operation restricted to the System Administrator

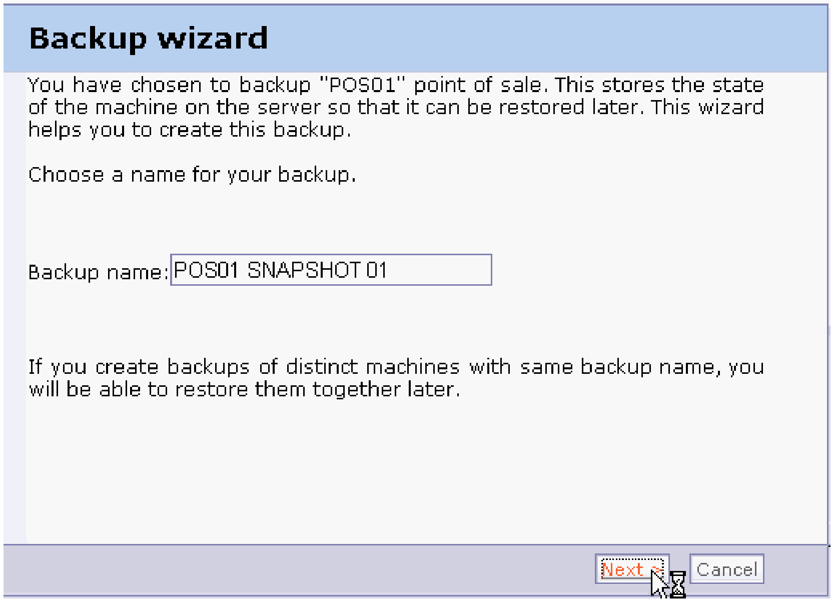
This computer is unknown to the OS provisioning server. Only the system administrator can trigger a deployment using the OS provisioning server Host Monitor.

Waiting for the remote monitor to unblock this host

Figure 5-8 POS system booted up in PXE mode

Note: The procedure for booting a POS terminal into PXE mode can vary depending on the model of the terminal and the configuration of the DHCP and PXE servers. In the case of our POS01 terminal, we found it necessary to manually interrupt the boot sequence and change the primary boot device to LAN, while on POS02 it was possible to initiate a boot from LAN by simply pressing F12 during bootup. See Appendix A, "Alternate boot sequence on POS systems" on page 133 for more information on this topic.

2. From the web console, right click the terminal's entry in the POS list and select **Backup**. This will start the POS backup wizard where you can enter a name for this backup (Figure 5-9 on page 106). Type a name and click **Next**.



Backup wizard

You have chosen to backup "POS01" point of sale. This stores the state of the machine on the server so that it can be restored later. This wizard helps you to create this backup.

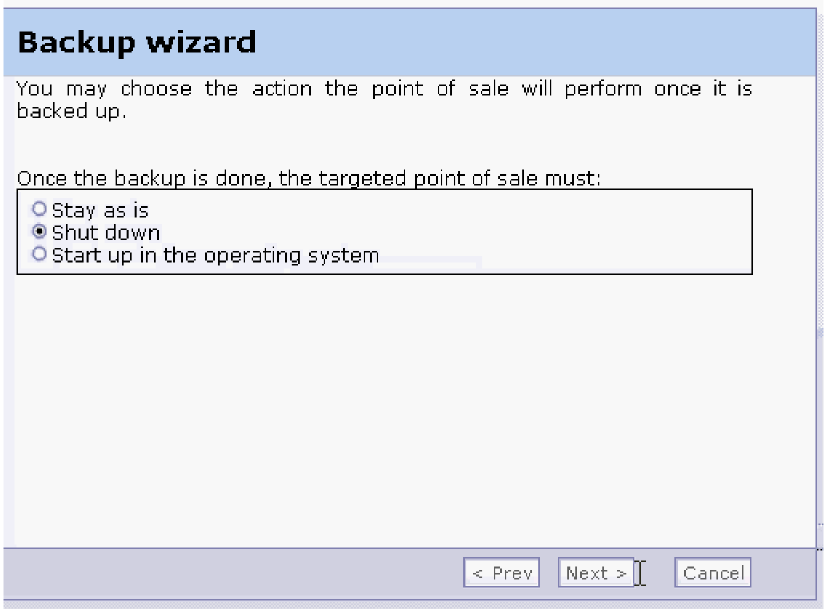
Choose a name for your backup.

Backup name: POS01 SNAPSHOT 01

If you create backups of distinct machines with same backup name, you will be able to restore them together later.

Figure 5-9 Enter a name for the backup

3. In the next window, choose the state you want the backup to attempt to leave the POS terminal in after the backup has been performed, and click **Next**. (Figure 5-10).



Backup wizard

You may choose the action the point of sale will perform once it is backed up.

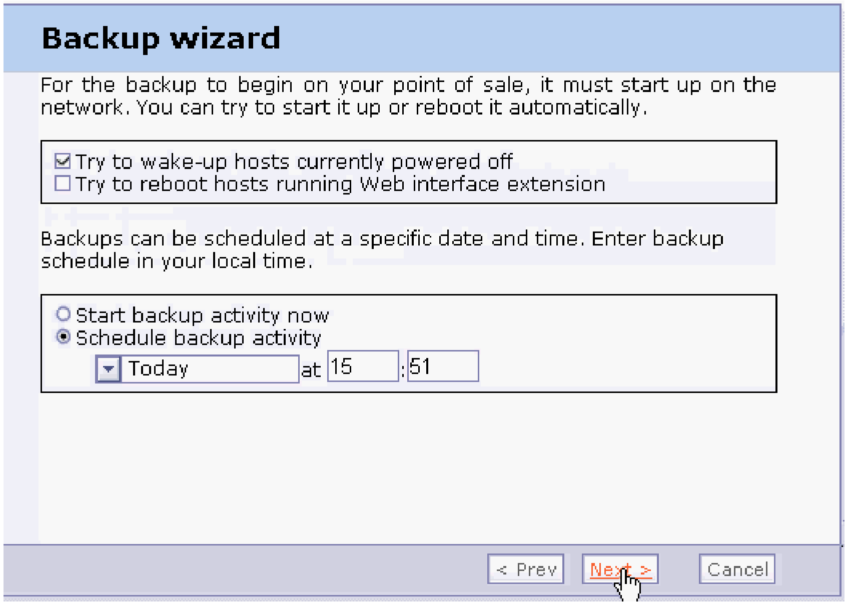
Once the backup is done, the targeted point of sale must:

○ Stay as is
● Shut down
○ Start up in the operating system

Figure 5-10 Selecting an action to perform after completing the backup

Note: In our lab environment the actual state that the POS terminal was left in after the backup was not always the one chosen. Settings such as BIOS boot options and Wake on LAN must also be configured to support the chosen option.

4. Select the action the backup should take to attempt to start the POS terminal backup and whether the backup should be scheduled for a future date or started immediately. Click **Next** (Figure 5-11 on page 108).



Backup wizard

For the backup to begin on your point of sale, it must start up on the network. You can try to start it up or reboot it automatically.

☑ Try to wake-up hosts currently powered off
□ Try to reboot hosts running Web interface extension

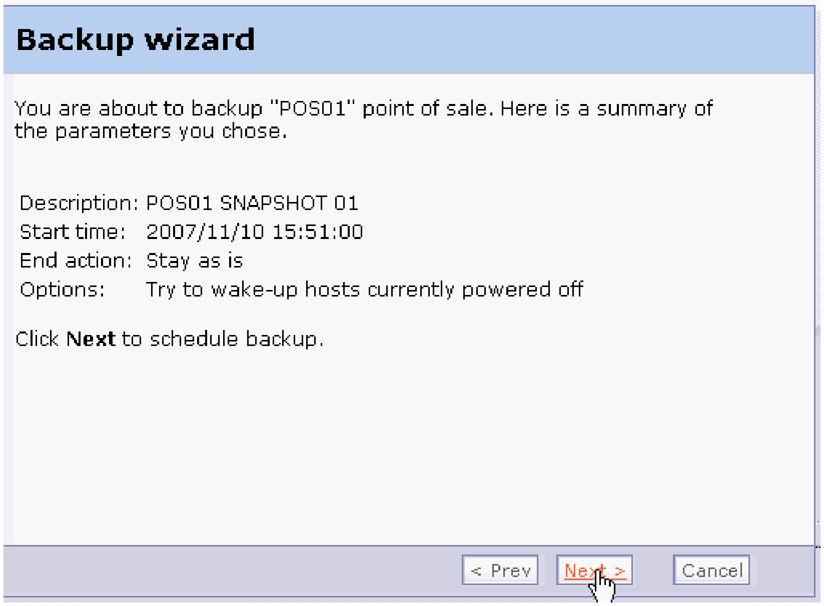
Backups can be scheduled at a specific date and time. Enter backup schedule in your local time.

○ Start backup activity now
● Schedule backup activity
Today at 15 : 51

Figure 5-11 Schedule the backup and optionally Wake on Lan or reboots

> **Note:** In our lab environment we observed that the backup operation would sometimes start, once initiated, without the terminal first rebooting.

5. Finally, the wizard displays a summary of the options selected. Confirm that the options are correct and then click **Next** to schedule the backup and dismiss the wizard (Figure 5-12 on page 109).



Backup wizard

You are about to backup "POS01" point of sale. Here is a summary of the parameters you chose.

Description:	POS01 SNAPSHOT 01
Start time:	2007/11/10 15:51:00
End action:	Stay as is
Options:	Try to wake-up hosts currently powered off

Click **Next** to schedule backup.

Figure 5-12 Confirming the backup options

When the backup operation starts the POS terminal will display a status screen showing the progress of the backup operation (Figure 5-13).

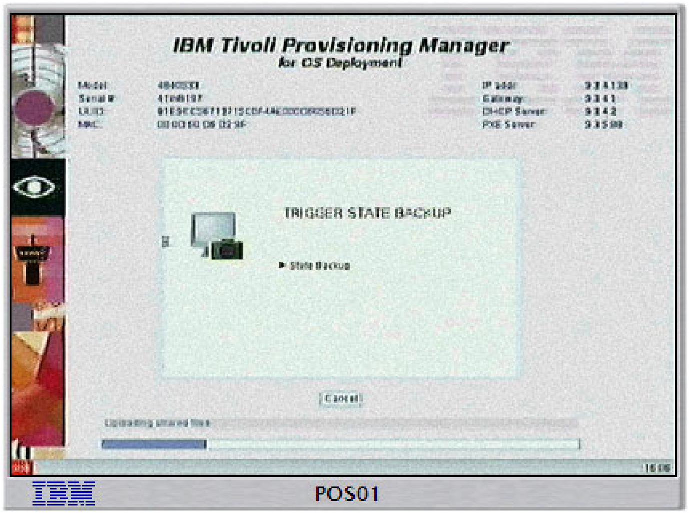
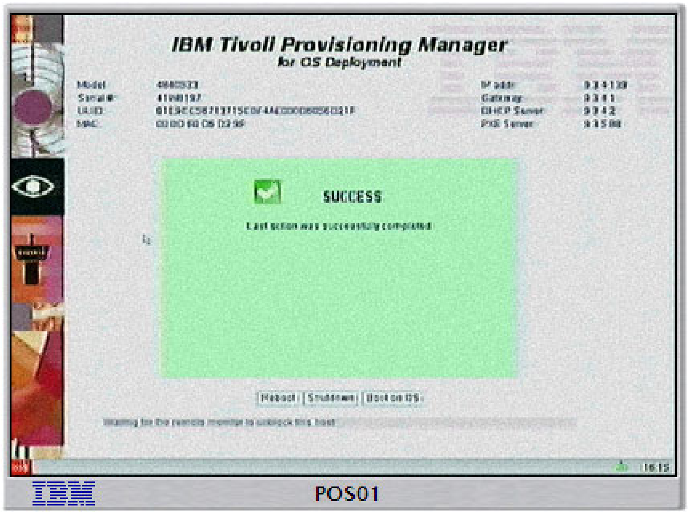


Figure 5-13 Progress of the state backup

When the backup has sucessfully completed, a screen similar to the one shown in Figure 5-14 will be displayed on the POS terminal



IBM Tivoli Provisioning Manager
for OS Deployment

Model: [illegible]
Serial #: [illegible]
UUID: [illegible]
MAC: [illegible]
IP addr: [illegible]
Gateway: [illegible]
DHCP Server: [illegible]
PXE Server: [illegible]

SUCCESS

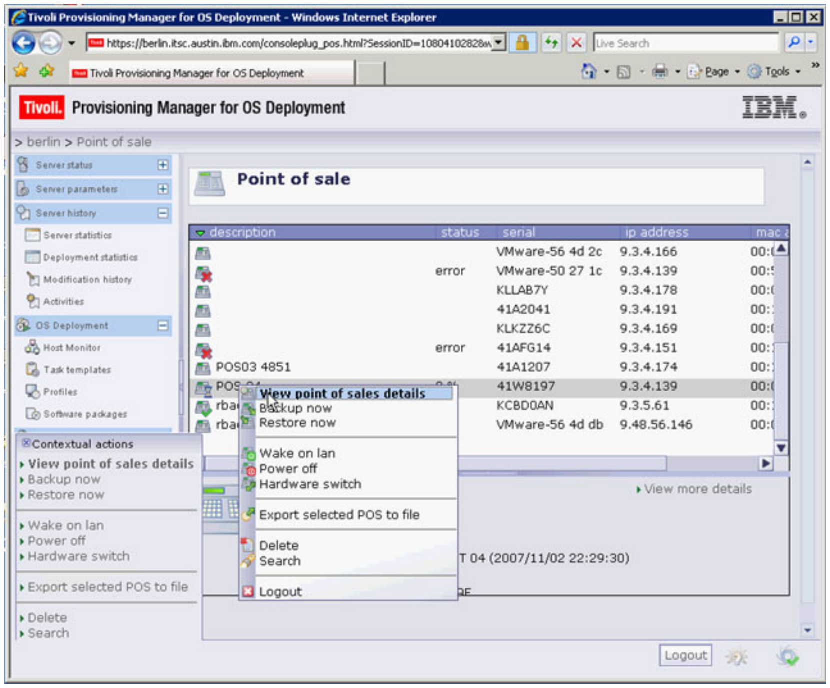
Last action was successfully completed

Waiting for the remote monitor to unblock this host

Figure 5-14 Backup successfully completed

5.4.2 Managing the list of backups

The list of backups that have been taken against a POS terminal can be displayed by right-clicking the POS terminal's entry in the POS terminal list and selecting "View point of sales details" (Figure 5-15 on page 111).

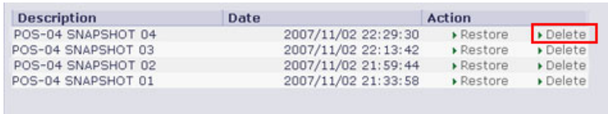


description	status	serial	ip address	mac a
		VMware-56 4d 2c	9.3.4.166	00:(
	error	VMware-50 27 1c	9.3.4.139	00:!
		KLLAB7Y	9.3.4.178	00:(
		41A2041	9.3.4.191	00::
		KLKZZ6C	9.3.4.169	00:(
	error	41AFG14	9.3.4.151	00::
POS03 4851		41A1207	9.3.4.174	00::
POS-04		41W8197	9.3.4.139	00:(
rba		KCBD0AN	9.3.5.61	00::
rba		VMware-56 4d db	9.48.56.146	00:(

Figure 5-15 POS context menu, selecting POS details

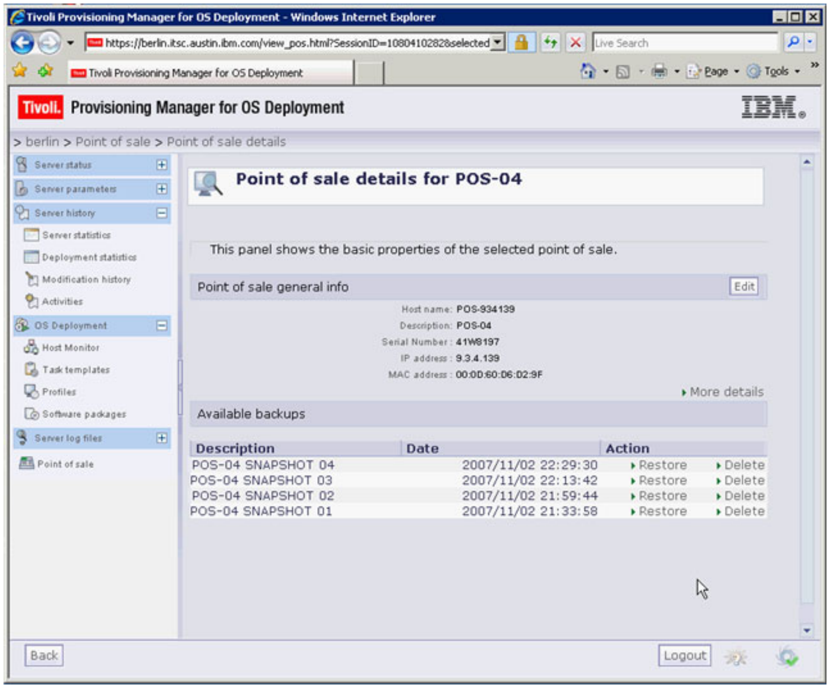
We created four backups of POS04 from our development/test server (BERLIN) (Figure 5-17 on page 112), making minor changes to the terminal's desktop between each in order to illustrate the state of the machine at the time of each backup.

Notice that for each backup in the list, there are two actions that may be performed: "Restore" and "Delete". We have highlighted the "delete" action (Figure 5-16). Clicking on a backup's delete action will cause that backup to be permanently removed from the list. The restore action is the subject of the next section.



Description	Date	Action	
POS-04 SNAPSHOT 04	2007/11/02 22:29:30	‣ Restore	‣ Delete
POS-04 SNAPSHOT 03	2007/11/02 22:13:42	‣ Restore	‣ Delete
POS-04 SNAPSHOT 02	2007/11/02 21:59:44	‣ Restore	‣ Delete
POS-04 SNAPSHOT 01	2007/11/02 21:33:58	‣ Restore	‣ Delete

Figure 5-16 Actions for individual backups


Tivoli Provisioning Manager for OS Deployment - Windows Internet Explorer
https://berlin.itsc.austin.ibm.com/view_pos.html?SessionID=10804102828selected
Live Search
Tivoli Provisioning Manager for OS Deployment
Page
Tools
Tivoli. Provisioning Manager for OS Deployment
IBM.
> berlin > Point of sale > Point of sale details
Server status
Server parameters
Server history
Server statistics
Deployment statistics
Modification history
Activities
OS Deployment
Host Monitor
Task templates
Profiles
Software packages
Server log files
Point of sale
Back
Logout

Point of sale details for POS-04

This panel shows the basic properties of the selected point of sale.

Point of sale general info [Edit]

Host name: POS-934139
Description: POS-04
Serial Number : 41W8197
IP address : 9.3.4.139
MAC address : 00:0D:60:06:02:9F

▸ More details

Available backups

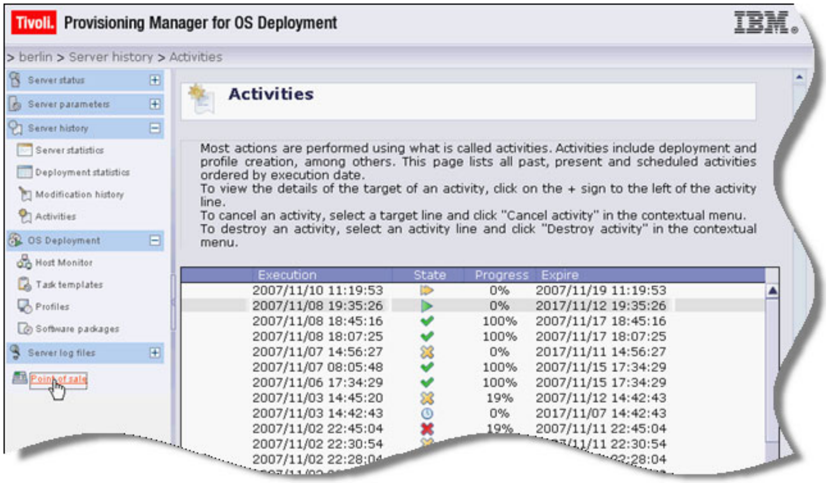
Description	Date	Action	
POS-04 SNAPSHOT 04	2007/11/02 22:29:30	▸ Restore	▸ Delete
POS-04 SNAPSHOT 03	2007/11/02 22:13:42	▸ Restore	▸ Delete
POS-04 SNAPSHOT 02	2007/11/02 21:59:44	▸ Restore	▸ Delete
POS-04 SNAPSHOT 01	2007/11/02 21:33:58	▸ Restore	▸ Delete

Figure 5-17 Point of sale details for a selcted system

5.4.3 Restoring a POS backup

We performed the following steps to restore a POS backup to POS04:

1. Login to the web console and click on “Point of Sale” (Figure 5-18 on page 113).

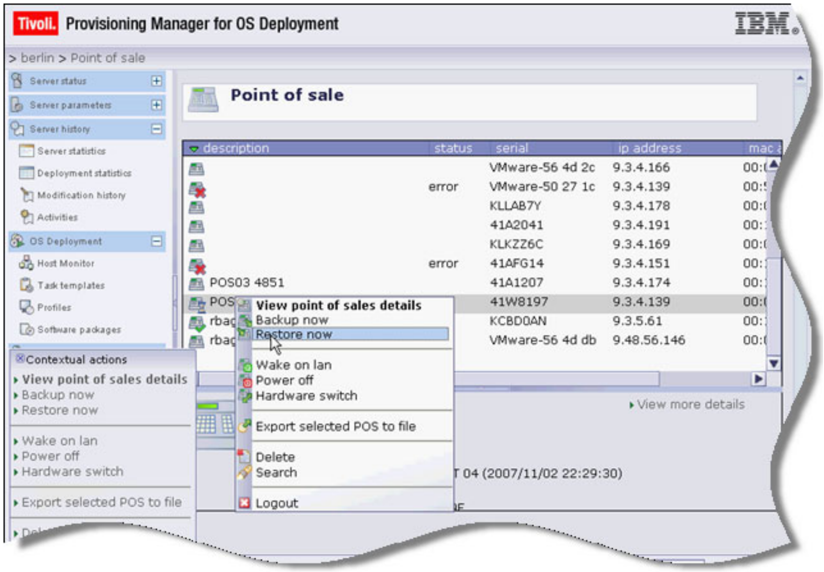


Most actions are performed using what is called activities. Activities include deployment and profile creation, among others. This page lists all past, present and scheduled activities ordered by execution date.
To view the details of the target of an activity, click on the + sign to the left of the activity line.
To cancel an activity, select a target line and click "Cancel activity" in the contextual menu.
To destroy an activity, select an activity line and click "Destroy activity" in the contextual menu.

Execution	State	Progress	Expire
2007/11/10 11:19:53	➪	0%	2007/11/19 11:19:53
2007/11/08 19:35:26	▶	0%	2017/11/12 19:35:26
2007/11/08 18:45:16	✓	100%	2007/11/17 18:45:16
2007/11/08 18:07:25	✓	100%	2007/11/17 18:07:25
2007/11/07 14:56:27	✗	0%	2017/11/11 14:56:27
2007/11/07 08:05:48	✓	100%	2007/11/15 17:34:29
2007/11/06 17:34:29	✓	100%	2007/11/15 17:34:29
2007/11/03 14:45:20	✗	19%	2007/11/12 14:42:43
2007/11/03 14:42:43	◷	0%	2017/11/07 14:42:43
2007/11/02 22:45:04	✗	19%	2007/11/11 22:45:04
2007/11/02 22:30:54			/11/11 22:30:54
2007/11/02 22:28:04			22:28:04

Figure 5-18 Selecting the Point of sale features from the left panel

2. Right-click on the entry for the terminal you want to restore and from the context menu and select **Restore** (Figure 5-19).

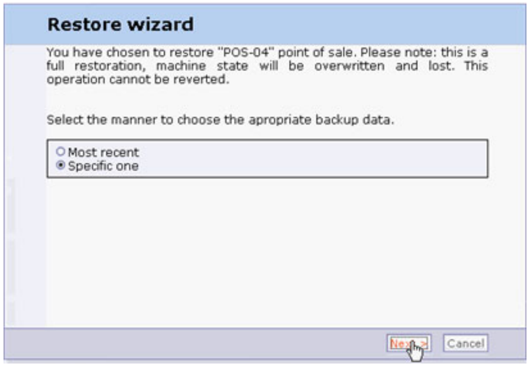


description	status	serial	ip address	mac a
		VMware-56 4d 2c	9.3.4.166	00:(
	error	VMware-50 27 1c	9.3.4.139	00:!
		KLLAB7Y	9.3.4.178	00:(
		41A2041	9.3.4.191	00::
		KLKZZ6C	9.3.4.169	00:(
	error	41AFG14	9.3.4.151	00::
POS03 4851		41A1207	9.3.4.174	00::
POS		41W8197	9.3.4.139	00:(
rbag		KCBD0AN	9.3.5.61	00::
rbag		VMware-56 4d db	9.48.56.146	00:(

Figure 5-19 Selecting restore now from the context menu

The restore wizard will start.

3. Choose whether to restore the most recent backup, or to specify a specific backup (Figure 5-20 on page 114) and click **Next**.



Restore wizard

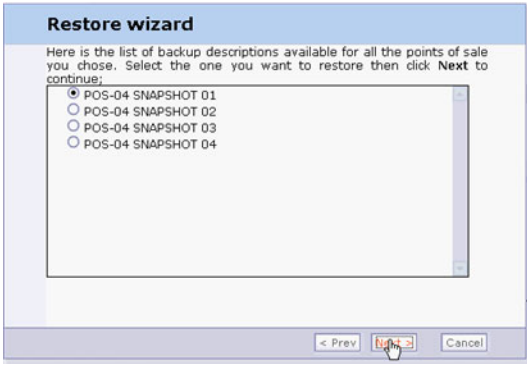
You have chosen to restore "POS-04" point of sale. Please note: this is a full restoration, machine state will be overwritten and lost. This operation cannot be reverted.

Select the manner to choose the apropriate backup data.

○ Most recent
● Specific one

Figure 5-20 Choosing most recent or specific backup

4. If you chose to select a specific backup in the previous step you must now select the backup you wish to restore (Figure 5-21) and click **Next**.



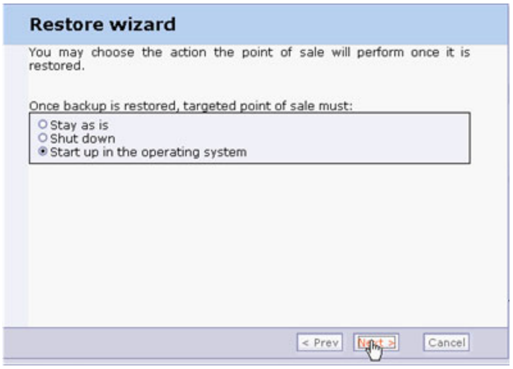
Restore wizard

Here is the list of backup descriptions available for all the points of sale you chose. Select the one you want to restore then click **Next** to continue:

● POS-04 SNAPSHOT 01
○ POS-04 SNAPSHOT 02
○ POS-04 SNAPSHOT 03
○ POS-04 SNAPSHOT 04

Figure 5-21 Select a specific backup

5. Choose the state that you would like the POS terminal to be placed in after the restore operation has completed (Figure 5-22 on page 115) and click **Next**.



Restore wizard

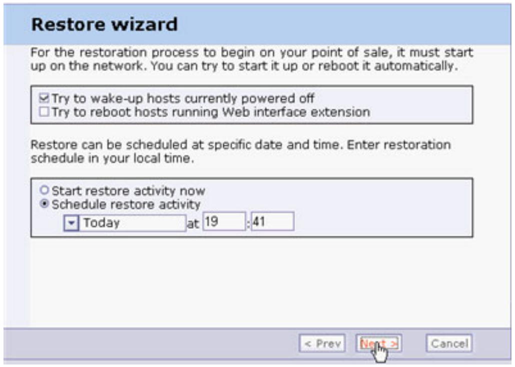
You may choose the action the point of sale will perform once it is restored.

Once backup is restored, targeted point of sale must:

○ Stay as is
○ Shut down
● Start up in the operating system

Figure 5-22 Select after-restore action

6. Indicate if Tivoli Provisioning Manager for OS Deployment should attempt to power on and/or reboot the target POS terminal in preparation for the restore. Also, specify whether the restore should begin immediately or at a future date and time (Figure 5-23) and click **Next**.



Restore wizard

For the restoration process to begin on your point of sale, it must start up on the network. You can try to start it up or reboot it automatically.

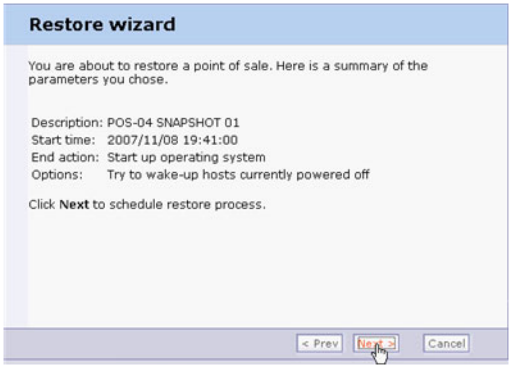
☑ Try to wake-up hosts currently powered off
☐ Try to reboot hosts running Web interface extension

Restore can be scheduled at specific date and time. Enter restoration schedule in your local time.

○ Start restore activity now
● Schedule restore activity
Today at 19 : 41

Figure 5-23 Schedule the restore

7. Review the restore options in the confirmation dialog and then click **Next** (Figure 5-24 on page 116).



Restore wizard

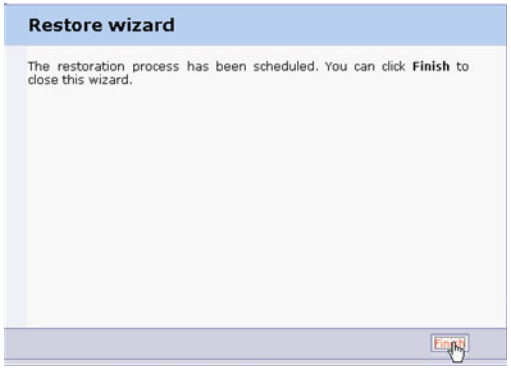
You are about to restore a point of sale. Here is a summary of the parameters you chose.

Description: POS-04 SNAPSHOT 01
Start time: 2007/11/08 19:41:00
End action: Start up operating system
Options: Try to wake-up hosts currently powered off

Click **Next** to schedule restore process.

Figure 5-24 Review the restore options

8. At this point, the restore operation will have been scheduled, and if scheduled to begin immediately it should now start. Click **Finish** to close the restore wizard (Figure 5-25).

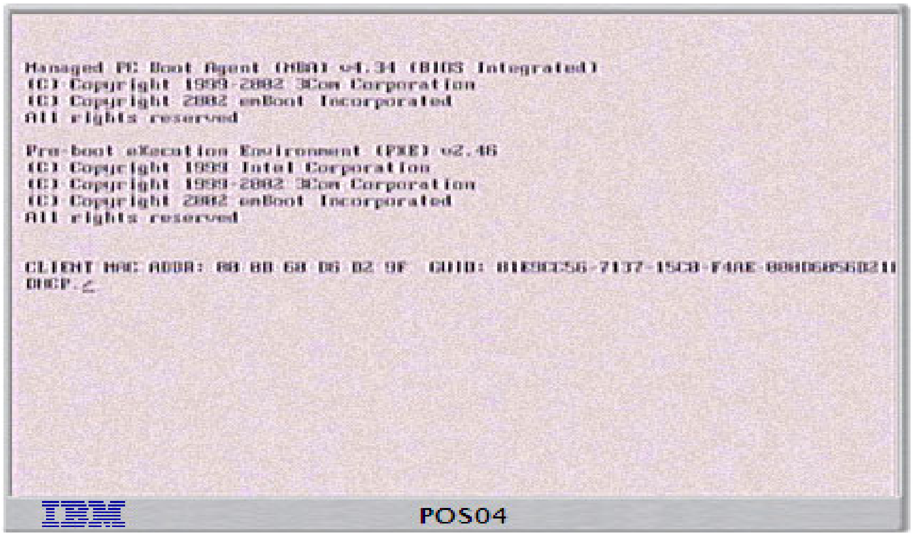


Restore wizard

The restoration process has been scheduled. You can click **Finish** to close this wizard.

Figure 5-25 Close the restore wizard

9. We specified that Tivoli Provisioning Manager for OS Deployment should wake the POS terminal in order to do the restore and our terminal (POS04) was turned off when we scheduled the restore. After we confirmed the restore settings, Tivoli Provisioning Manager for OS Deployment did, indeed send a Wake on LAN packet to POS04 which caused it to power up and begin booting (Figure 5-26 on page 117).



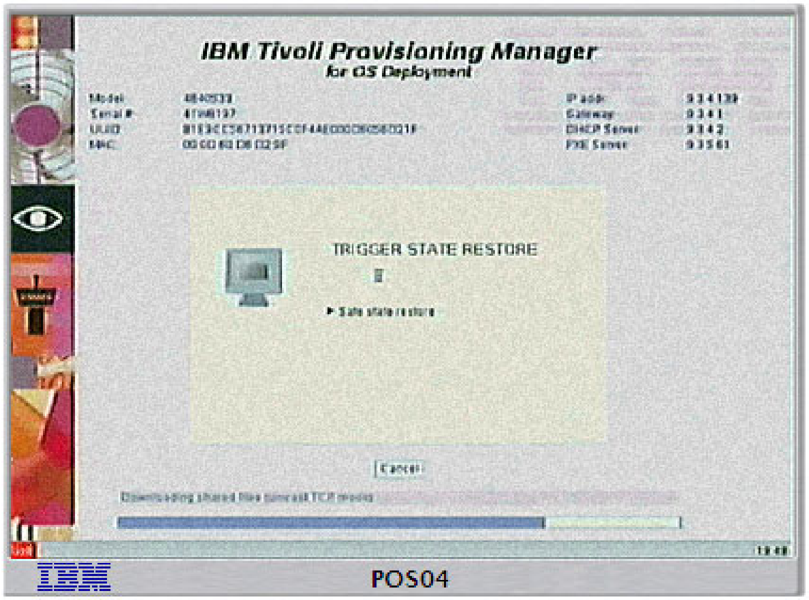
```
Managed PC Boot Agent (MBA) v4.34 (BIOS Integrated)
(C) Copyright 1999-2002 3Com Corporation
(C) Copyright 2002 emBoot Incorporated
All rights reserved

Pre-boot eXecution Environment (PXE) v2.46
(C) Copyright 1999 Intel Corporation
(C) Copyright 1999-2002 3Com Corporation
(C) Copyright 2002 emBoot Incorporated
All rights reserved


CLIENT MAC ADDR: 00 0D 60 D6 02 9F  GUID: 81E9CC56-7137-15C0-F4AE-000D6056021I
DHCP./
```

Figure 5-26 POS system booting up from the network

10..After POS04 had booted into PXE mode, the restore operation began (Figure 5-27).



IBM Tivoli Provisioning Manager
for OS Deployment

Model	4840533	IP addr	9.3.4.139
Serial #	41VW8137	Gateway	9.3.4.1
UUID	81E9CC56713715C0F4AE000D6056021F	DHCP Server	9.3.4.2
MAC	00 0D 60 D6 02 9F	PXE Server	9.3.5.61

TRIGGER STATE RESTORE

▸ Safe state restore

Downloading shared files (unicast TCP mode)

Figure 5-27 POS system connected to Tivoli Provisioning Manager for OS Deployment server

11..The restore operation ran for several minutes and then, as we had specified, it booted POS04 into the operating system (Figure 5-28 on page 118).

Figure 5-28 POS system up and running

5.5 Switching hardware

When a POS device experiences a hardware malfunction it can potentially have a major impact on a store's ability to provide service to its customers. Therefore, it is a good idea to have at least one spare POS device availabe that can be used to replace a malfunctioning device either permanently, or temporarily while the ailing device is being repaired.

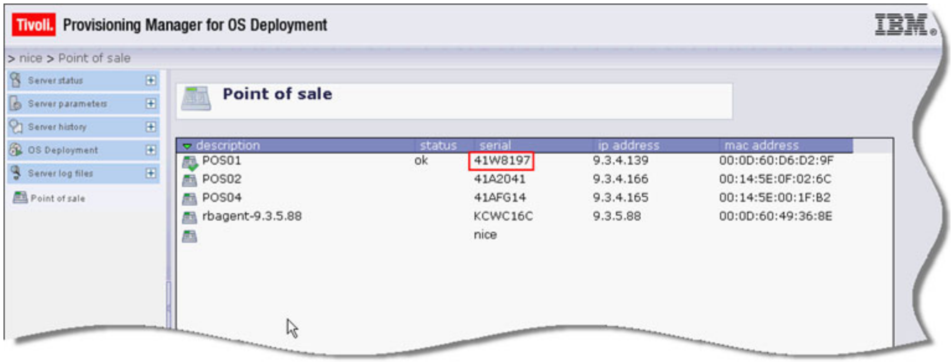
If the hard drive of the affected POS device is okay then, in theory, it might be possible to install it into a different device of the same model in order to obtain a working machine with the same software state as the broken one. However, this would not generally be practical at a retail outlet because of the expertise needed to perform the change, and the time that would be spent waiting for qualified personnel to be dispatched to perform it. The POS plug-in provides another alternative—the "Hardware Switch" function.

In section 5.4, "Creating Backups" we discussed the fact that backups created with the POS plug-in are intended to only be restored to that same machine. However, by using the "Hardware Switch" function, we can get Tivoli Provisioning Manager for OS Deployment to logically substitue a different terminal in place of one that currently exists. Once this substitution has been performed, the backups that were made against the old terminal, may be restored on the new hardware which will then function in place of the original.

> **Attention:** It is important to emphasize that when performing a hardware switch the replacement unit must be exactly the same model and configuration as the machine it is replacing.

In our lab environment we used the hardware switch function to replace POS01 with POS02. Unfortunately, we did not have two machines of exactly the same model available to us and therefore, once the switch and restore had been completed, the newly configured POS01 (formerly POS02) would not boot the operating system sucessfully. This should serve to emphasize the warning above.

Note that in the POS list, the machine with the serial number: **41W8197**, has the name POS01 (Figure 5-29). This is the original POS01 which we have taken several backups against. The machine with serial number: **41A2041**, is labeled "POS02" and will become the new POS01.



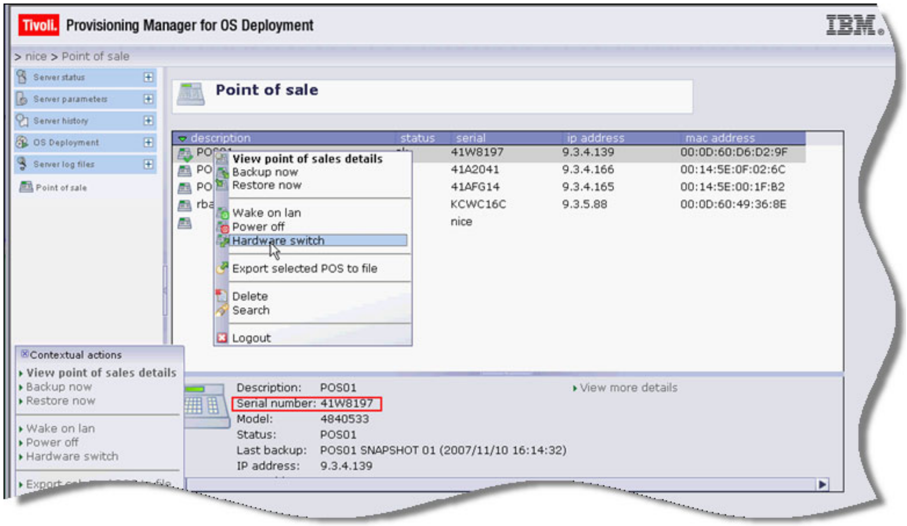
Point of sale

description	status	serial	ip address	mac address
POS01	ok	41W8197	9.3.4.139	00:0D:60:D6:D2:9F
POS02		41A2041	9.3.4.166	00:14:5E:0F:02:6C
POS04		41AFG14	9.3.4.165	00:14:5E:00:1F:B2
rbagent-9.3.5.88		KCWC16C	9.3.5.88	00:0D:60:49:36:8E
		nice		

Figure 5-29 List of POS systems

We performed the following steps on our production server (NICE) to accomplish a hardware replacement of POS01 with POS02:

1. Boot the replacement terminal (POS02) into PXE mode.
2. Right-click the the entry for POS01 in the POS terminal list, and select "Hardware Switch" from the context menu (Figure 5-30).

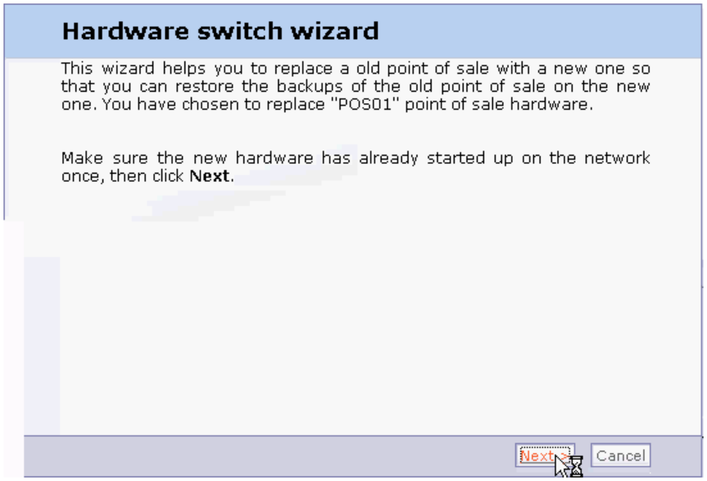


description	status	serial	ip address	mac address
PO		41W8197	9.3.4.139	00:0D:60:D6:D2:9F
PO		41A2041	9.3.4.166	00:14:5E:0F:02:6C
PO		41AFG14	9.3.4.165	00:14:5E:00:1F:B2
rba		KCWC16C	9.3.5.88	00:0D:60:49:36:8E
		nice		

Description: POS01
Serial number: 41W8197
Model: 4840533
Status: POS01
Last backup: POS01 SNAPSHOT 01 (2007/11/10 16:14:32)
IP address: 9.3.4.139

Figure 5-30 Selecting the Hardware switch function

The hardware switch wizard will start (Figure 5-31). Click **Next**.

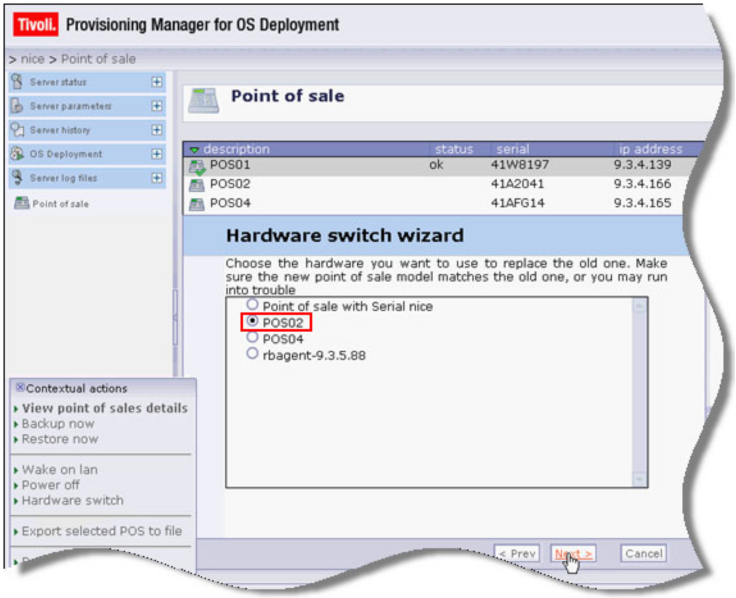

Hardware switch wizard

This wizard helps you to replace a old point of sale with a new one so that you can restore the backups of the old point of sale on the new one. You have chosen to replace "POS01" point of sale hardware.

Make sure the new hardware has already started up on the network once, then click **Next**.

Figure 5-31 Hardware switch wizard

3. From the list of other POS terminals known to Tivoli Provisioning Manager for OS Deployment, select "POS02" (Figure 5-32) and click **Next**.



Point of sale

description	status	serial	ip address
POS01	ok	41W8197	9.3.4.139
POS02		41A2041	9.3.4.166
POS04		41AFG14	9.3.4.165

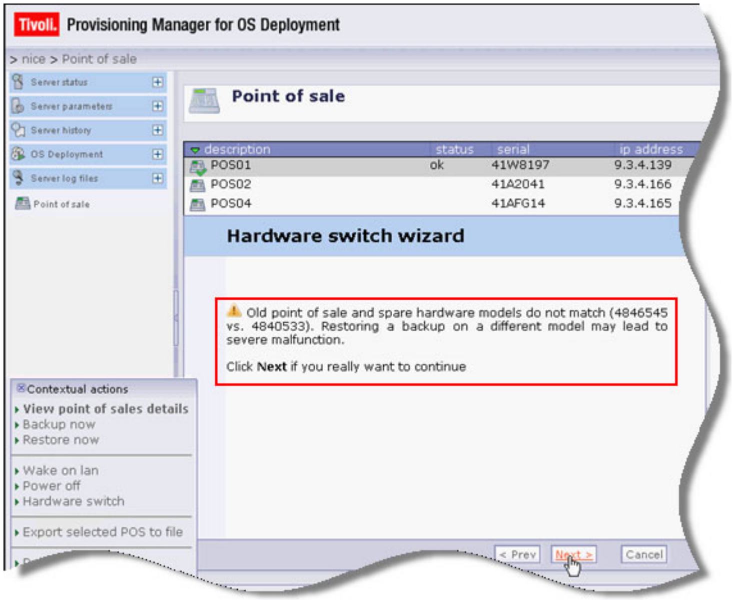
Hardware switch wizard

Choose the hardware you want to use to replace the old one. Make sure the new point of sale model matches the old one, or you may run into trouble

○ Point of sale with Serial nice
● POS02
○ POS04
○ rbagent-9.3.5.88

Figure 5-32 Select the new system to replace the old one

4. At this point, the POS plug-in recognizes that we have chosen to replace POS01 with a different model of POS terminal and it displays a warning (Figure 5-33 on page 122).



Point of sale

description	status	serial	ip address
POS01	ok	41W8197	9.3.4.139
POS02		41A2041	9.3.4.166
POS04		41AFG14	9.3.4.165

Hardware switch wizard

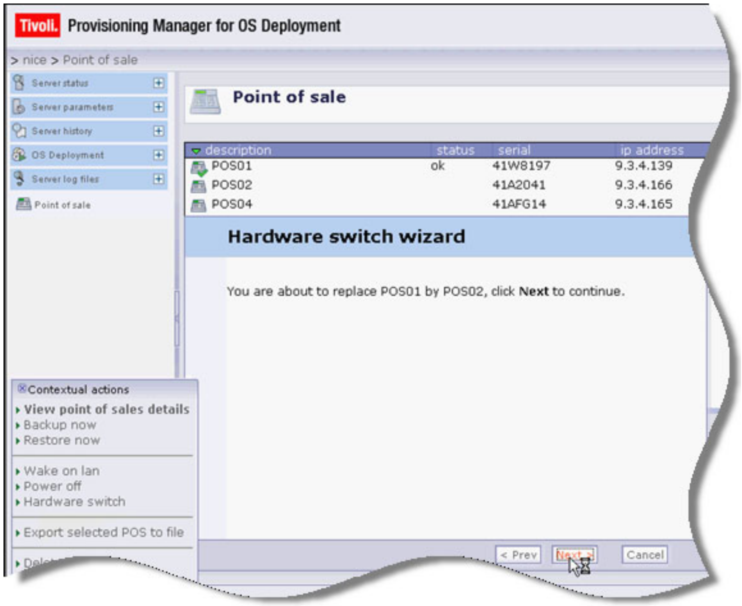
Old point of sale and spare hardware models do not match (4846545 vs. 4840533). Restoring a backup on a different model may lead to severe malfunction.

Click **Next** if you really want to continue

Figure 5-33 Warning that the POS systems are not identical

In our case, we will click **Next** to continue, but in a real-world sceneario this would likely be a bad idea.

5. Now the plug-in has all of the information it needs to perform the switch, so it prompts us for confirmation (Figure 5-34 on page 123).



Point of sale

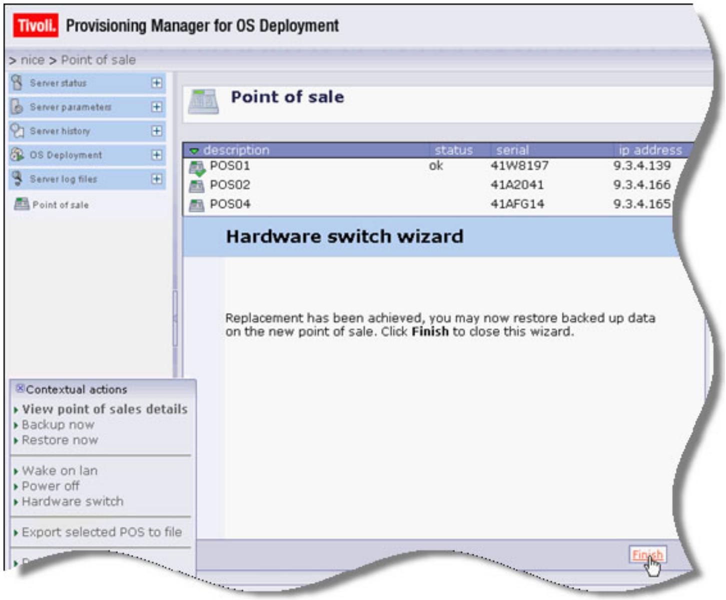
description	status	serial	ip address
POS01	ok	41W8197	9.3.4.139
POS02		41A2041	9.3.4.166
POS04		41AFG14	9.3.4.165

Hardware switch wizard

You are about to replace POS01 by POS02, click **Next** to continue.

Figure 5-34 Confirming the hardware switch

6. Now click **Next** and the plug-in performs the switch. Once it has finished it displays one last window reporting the result (Figure 5-35).



Point of sale

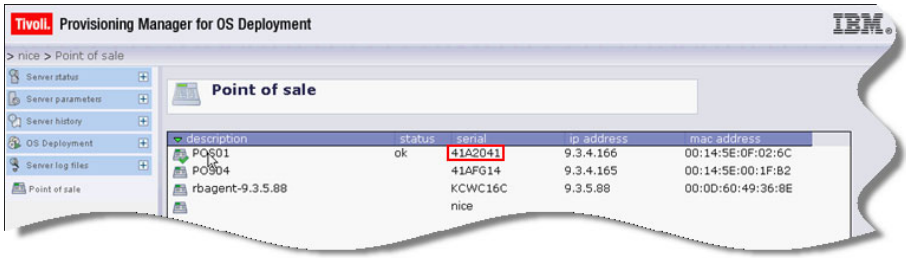
description	status	serial	ip address
POS01	ok	41W8197	9.3.4.139
POS02		41A2041	9.3.4.166
POS04		41AFG14	9.3.4.165

Hardware switch wizard

Replacement has been achieved, you may now restore backed up data on the new point of sale. Click **Finish** to close this wizard.

Figure 5-35 Hardware switch completed

7. Click **Finish** to exit the wizard. You will note that in the point of sale list, the machine with serial number: **41A2041**, is now known to Tivoli Provisioning Manager for OS Deployment as “POS01”, while the original POS01, with serial number **41W8197**, is no longer listed (Figure 5-36).



Point of sale

description	status	serial	ip address	mac address
POS01	ok	41A2041	9.3.4.166	00:14:5E:0F:02:6C
POS04		41AFG14	9.3.4.165	00:14:5E:00:1F:B2
rbagent-9.3.5.88		KCWC16C	9.3.5.88	00:0D:60:49:36:8E
		nice		

Figure 5-36 Veryfying the hardware switch from the POS overview

In the real world, we would now be able to restore backups that were created against the original POS01, to the new machine that has assumed that name so that the new machine could function in its place.

However, since we have - against the advice of the hardware switch wizard - substituted a machine of a different model, we end up with a terminal that won’t boot its operating system.

This example serves to underscore the importance of using exactly the same model of POS terminal hardware when performing a hardware switch. In this case, only half of the screen is visible on the terminal because, among other things, the video driver is not the correct one for this machine.

Note: After the excercise above, we were able to perform another hardware switch and two backup restores to return POS01 and POS02 to their original configurations.

6

Real world deployment scenarios

In a real-world environment, there will normally be (at least) a development environment and a production environment. Depending on network capacity between sites, and requirements for deployment and restore-time, it may prove more practical with one production server for each site.

This chapter provides information about setting up an environment consisting of a central environment for development and testing with several production servers distributed to local sites. It is also explained how newly created profiles, software packages and deployment schemes are staged from development/test to production servers.

In this chapter we also discuss implementation, architecture, and common challenges of the point-of-sale environment. Subjects such as server sizing and placement, distributions using unicast and multicast, firewalls, and security considerations are discussed.

6.1 Large environment considerations

The target organization for our enterprise design is a growing point-of-sale organization based in multiple locations including stores, warehouses and a central IT location. Each facility has between 50 and 100 point-of-sale devices and 4 to 10 servers. The organization want the implementation to be global in nature, for example a central database for the deployment history and inventory. A central database also provides backup server capability. As is IT best practice, the organization wants the design to include a test facitliy for the creation and testing of profiles and packages. The test facility will include a development environment and a pre-production environment. This environment will allow for the capture and testing of profiles, deployment schemes, and the export/import process between environments. The following are the high-level requirements of the system:

- To develop a low-risk methodology of rolling out the new POS systems
- To reduce the cost and complexity of rebuilding a POS system
- To make the rebuild process no touch

6.1.1 Managing development and production environments

Below are some definitions for three typical types of environments in an enterprise IT infrastructure.

Test environment

The test facility is being installed as two separate systems. First the development environment, then the pre-production environment. Both of these environments are linked by a physical network and processes to migrate profiles from test to pre-production.

Pre-production environment

The pre-production environment is a representative subset of the production environment. It consists of a master server, a slave server and where possible one of each production target systems. Depending on the actual production topology it may be prudent to incorporate a simulated or real slow network link between the master and slave servers.

Production environment

The production environment, shows five sites sharing the one RDBMS with the central IT location acting as the master. The master server hosts the RDBMS for the implementation and is a dedicated server. The four slave servers represent the different warehouse and store locations that the master sychronizes with to allow for distribution of images across the enterprise.

6.1.2 Expanding from one to multiple servers

The general architecture for Tivoli Provisioning Manager for OS Deployment is a two-tiered architecture consisting of a Tivoli Provisioning Manager for OS Deployment master server and multiple clients slaves that synchronize with the data on the master. There are two primary methods for expanding the Tivoli Provisioning Manager for OS Deployment architecture from a single server to mulitple servers. The first approach is to have a single instance of the database which all masters and slave Tivoli Provisioning Manager for OS Deployment servers connect to via ODBC or JDBC. The second approach is to utilize the netclnt command on each slave server to synchronize with the master server.

In the first approach, a central multiuser database like DB2® is created on a server that the master and slave Tivoli Provisioning Manager for OS Deployment servers have access to. Once the database server is setup then an ODBC/JDBC connection is configured prior to installation of the Tivoli Provisioning Manager for OS Deployment product is installed, using the same name that would normally be created during installation. Once the ODBC/JDBC connection is created on each server that will be either a master or a slave then install the server product. Once the product is installed go into the **server** → **server parameters** → **server synchronization** panel to assign the roles of master and slave to each Tivoli Provisioning Manager for OS Deployment server.

In the second approach, each Tivoli Provisioning Manager for OS Deployment server is installed as a standalone server with an independent database. In order for the slaves to synchronize their data with the master the netclnt command must be scheduled on each slave which establishes a connection to the master's database. In this scenario, the relationship between master and slave are not visualized in the GUI as in the first approach.

In both scenarios, a Tivoli Provisioning Manager for OS Deployment server can be both a master and a slave depending on how they are configured.

6.2 Replicating software and configurations

There are three methods you can use to replicate images between Tivoli Provisioning Manager for OS Deployment servers:

- Automated, using built-in replication service between two servers
- Manual, using the command line tool

- Manual, using the console

Each method is described in the next sections.

6.2.1 Built-in file replication service

In a multi-tiered implementation, one server is designated as the master server. This is usually the server at the master site, but must be the server where profiles are inserted into the system. The other servers in the environment are designated as slave servers.

When replication starts, the new table of contents files are all sent to the receiving server or servers. Each receiving server then compares those table of contents files with the table of contents files it has and builds a list of all the files it requires to be up-to-date. It then sends that requirements list file back to the master server. The master server then builds an RAD file of all these required files and commences replicating it to the receiving server using no more than the bandwidth specified in the replication setup panel. As the file repository only ever stores one copy of any specific file, subsequent to the initial replication of a particular OS, all that should ever traverse the network is the delta between the existing profiles and the new profiles. This feature saves a large amount of network bandwidth. The data flow is shown in Figure 6-1 on page 128.

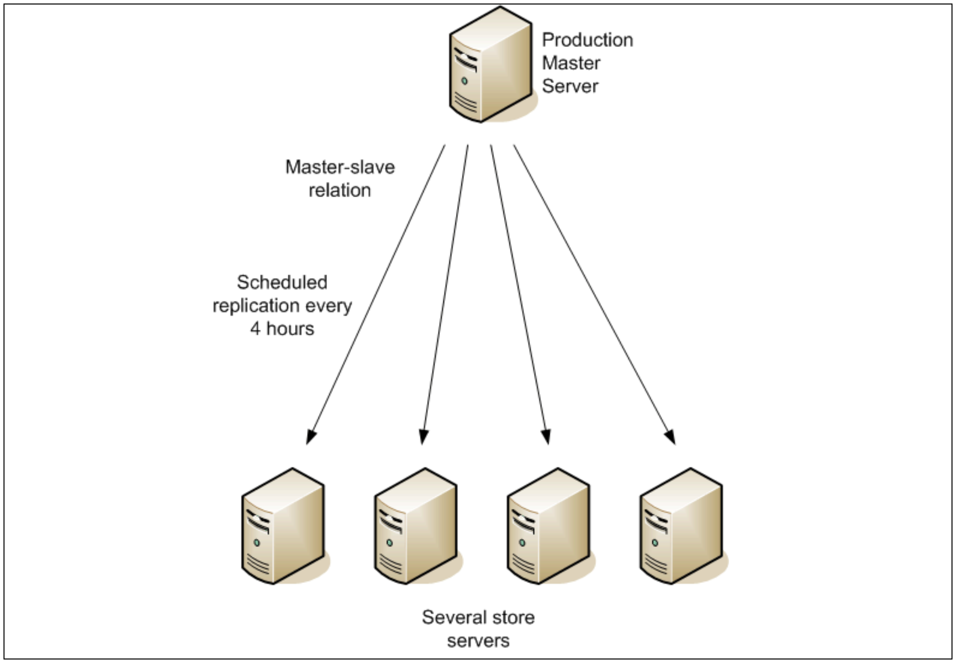


Figure 6-1 Using the built-in file replication between several servers

In a multi-server environment with automated replication, the replication setup has to be given some consideration as it is done on a schedule. It is important that enough time is given between scheduled instances for the replication to complete. In the instance of three-tiered architecture, each predecessor must be completed prior to the successor starting. Into this equation you must factor the bandwidth limitation you place on the replication.

The built-in replication method is recommended for automated distribution in the production environment.

6.2.2 Command line method

Tivoli Provisioning Manager for OS Deployment offers a command line interface called RbAgent. RbAgent can be run from any workstation that has connectivity to the Tivoli Provisioning Manager for OS Deployment server. When executed the RbAgent command connects back to the Tivoli Provisioning Manager for OS Deployment server and runs the command.

Note: Running the command requires that the necessary sync.pac file is present on the server, by default in the directory
C:\Program Files\Common Files\IBM Tivoli\packages directory.

This command line capability offers excellent integration opportunities with preexisting tools for file transfer and configuration management, such as those Table of Contents files sent to slave server at a scheduled time. The command syntax is explained in the users guide.

The principle for manual replication using the command line is illustrated in Figure 6-2.

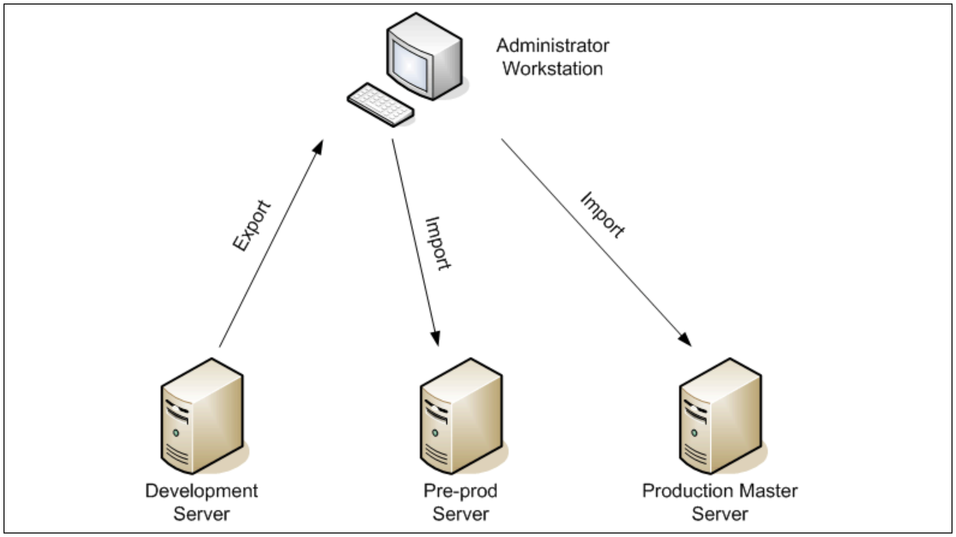


Figure 6-2 Manual replication using the command line tool

The command line method is recommended for copying or staging profiles and software packages from development to pre-prod and from pre-prod to production environments.

6.2.3 Profile migration

The separation of development, test, and production environments is a long standing IT best practice. Tivoli Provisioning Manager for OS Deployment incorporates functions that allow for the export and import of developed profiles, software packages, and deployment schemes. This allows these objects to be moved between environments easily and quickly.

Export

Use the following steps to export a profile, software package, or deployment scheme:

1. Go to the OS Deployment screen.
2. Select one of the following: system profiles screen, the software deployments screen, or the deployment scheme screen.
3. At the bottom of the screen select RAD Export. This starts the RAD Export Wizard. You will be guided through a series of screens allowing you to select the items you want to export. The server will analyze the objects you want to export and approximate the size of the export file and give you the following three options for how to deal with the file:

4. You could download it directly to the computer you were accessing the Tivoli Provisioning Manager for OS Deployment server from. This would allow you to use it as a staging point.
5. You can export to a directory on the Tivoli Provisioning Manager for OS Deployment server. This may be the option you use if you have physically separate environments and need to load the file onto a removable device to move it. Or you had another tool that was going to do the physical move for you.
6. You can move the file directly to another machine that is running the Tivoli Provisioning Manager for OS Deployment Web extension, RbAgent. With this option, if the importing system is accessible in the network you are connected to, you could move the file directly to that computer.

Import

1. At the importation end, it is almost a reverse of the export.
2. Navigate to the OS Deployment screen.
3. Select one of the following: the system profiles screen, the software deployments screen, or the deployment scheme screen.
4. At the bottom of that screen select RAD Import. You are presented with the following three options for the location of the .RAD file for import:
5. The local computer you are working from.
6. The Import directory of the importing server. You may recall that one of the export options was to export to the importing server.
7. The IP address of a server running the Web extension where the file is located.
8. Which ever option you choose, the next step is to identify the .RAD file at the location you selected for importation. Tivoli Provisioning Manager for OS Deployment will then analyze the file and import the parts of it that it requires. Remember that it is just the files that are not already stored on the server that it will import.

6.3 Network Bandwidth Considerations

Depending on the number of computers you are deploying simultaneously and on your infrastructure, you should select one of the following networking modes:

6.3.1 Unicast

Use unicast if you are deploying computers one by one, or if your network administrator does not allow you to use multicast.

Note: that when deploying several computers simultaneously in unicast, the deployment time will tend to increase dramatically with the number of clients, as the result of network saturation

6.3.2 Multicast

Use multicast without explicit synchronization to use Tivoli Provisioning Manager for OS Deployment soft-synchronized multicast protocol. Using this protocol, every client will independently start downloading images at soon as it is ready, and continue with the deployment as soon as it has downloaded all required material. But when two or more hosts (using the same deployment scheme) are downloading files in parallel, they will automatically share the same bandwidth using a multicast protocol. The fastest client will have the priority for the choice of the next shared files that will be sent by the server, but the slower clients will also be able to receive them if they need them. This is a scalable solution that nevertheless allows for a rolling deployment scenario.

6.3.3 Multicast with synchronization

Multicast with synchronization to use a classical synchronized multicast method. This mode is adequate when you want to install computers by batches. You must then enter the synchronization parameters, e.g. the number of hosts to wait for before starting the download, and the maximum timeout before starting anyway. You can also select an upper bound to the peak network bandwidth used by the file downloads. It may be useful to set a limit in case the network is used for other services or to avoid the saturation of old routers. The bandwidth limitation boundary value is indicative. Depending on the hardware of the server, the client and the network components, the exact throughput may change. You can choose between no bandwidth limitation and limitations down to 2 Megabits per second.

A

Alternate boot sequence on POS systems

Tivoli Provisioning Manager for OS Deployment relies heavily on the capability of booting the target system from the network in order to catch the PXE server.

Traditionally, on Desktop PCs, laptops and Intel servers, the normal boot sequence can be interrupted just after POST by pressing F12 or similar. Here, POS systems are different. First off, they do not necessarily have a keyboard with F12 attached, secondly, not all systems have support for the alternate boot sequence.

This appendix explains the principles to be applied using some practical examples from the environment used during the writing of this document

When to boot from hard drive and from network

For normal operation, the boot sequence should include boot from hard drive before boot from network. A normal boot sequence could look something like this:

- Floppy
- CD-ROM
- Hard drive
- Network

The actual naming may be different from one system to another.

Assuming there are no floppy or CD-ROM, The system will normally just boot on the hard drive. If the hard drive does not have a master boot record, MBR, that makes it possible to boot from the hard drive, the system will try to boot from the network. This means that if the system has just been delivered (with no preinstalled operating system), or the hard drive has been replaced due to a failure, the system will boot on the network and connect to the Tivoli Provisioning Manager for OS Deployment server.

This is an ideal situation for the deployment scenario, but there are situations where it is necessary to force the system to boot in PXE mode. This includes the following scenarios:

- To take a system image backup of a working system (in order to be able to perform a system image restore at a later point in time if needed).
- To start a re-deployment after a hard drive has been replaced, and the new hard drive is preloaded with an operating system.
- To start a re-deployment because the system has been left unusable, but it still seen as a bootable device.

Forcing a POS system to boot into PXE mode

On traditional workstations and laptops this can normally be achieved by pressing the `F12` key or similar during system startup. This will either prompt the user for an alternate boot device or simply try to boot from the network.

On POS systems, however, this is not always possible. Instead, the boot sequence must be changed so the system tries to start from the network before trying to start from the hard drive.

To invoke the BIOS configuration, either press the **Del** key or tap the touch screen twice when prompted during system startup. There are two ways to navigate through the configuration menus. Either use the keyboard if available, or use the touch screen and the keyboard that is displayed.

Navigate to the advanced BIOS features.

Navigate to the first boot device and change it to the network.

Once the boot sequence has been changed, press **F10** to save and exit. The system should now boot and try the boot devices in the sequence specified.

Note: In some situations, the network boot server may not answer fast enough, which may cause the POS device to timeout and continue to next boot device. If this happens, a workaround is to remove any other boot device than the network, so it cannot proceed the boot process with another device.

After completing the tasks that required excplicit boot into PXE mode, make sure the boot sequence is changed back to normal (for example: floppy, CD-ROM, Hard Disk and Network). Otherwise the system will continue to boot from the network.

Preparing alternate boot sequence for Wake on LAN

Some of the POS systems support wake on LAN technology. If this is the case, the Wake on LAN can be combined with the alternate boot sequence, so the system will always try to boot from the network first, when it is started from a wake on LAN command.

B

Additional material

This paper refers to additional material that can be downloaded from the Internet as described below.

Locating the Web material

The Web material associated with this paper is available in softcopy on the Internet from the IBM Redbooks Web server. Point your Web browser at:

ftp://www.redbooks.ibm.com/redbooks/REDP4372

Alternatively, you can go to the IBM Redbooks Web site at:

ibm.com/redbooks

Select the **Additional materials** and open the directory that corresponds with the IBM Redpaper form number, REDP4372.

Using the Web material

The additional Web material that accompanies this paper includes the following files:

File name *Description*

Redp4372.zip	Zipped animations

System requirements for downloading the Web material

The following system configuration is recommended:

Hard disk space:	????MB minimum????
Operating System:	????Windows/Linux????
Processor:	???? or higher????
Memory:	????MB????

How to use the Web material

Create a subdirectory (folder) on your workstation, and unzip the contents of the Web material zip file into this folder.

Glossary

BIOS Basic Input/Output System. This is the firmware code that runs when the computer is powered up, as the first step in the power-on selftest.

MBR Master Boot Record, the first sector on a partitioned hard drive. After power-on Selftest is completed, the code in MBR is executed and will normally bootstrap the operating system on the first primary partition on the hard drive.

MSI Windows Installer, previously known as Microsoft Installer. A solution defined by Microsoft for handling installation and uninstallation of software on Windows operating systems.

POS point-of-sale when referred to in IBM context. Can also be point-of-service in context of Microsoft Windows Embedded for POS or Suse Linux for POS.

POST Power-on self-test. Covers the pre-boot sequence when the PC is powered-up, until control is handed over to the operating system boot. This is typically part of the BIOS or system firmware.

PXE Preboot Execution Environment. A technology that enables a system to be booted via the network interface card from a remote server. This process requires a DHCP server and a server with the bootstrap code, called a DHCP Proxy. The DHCP Proxy is in this Redpaper the

VLAN Virtual LAN. A technology that enables systems connected to different switches to communicate as if they were all on the same hub, while other systems connected to the same switches may use another VLAN to connect as they were all on the same hub. The VLAN technology makes it possible to separate systems connected to the same switch into two or more networks.

WOL Wake on LAN. A technology that enables a system to be powered up via a “magic packet” that is send over the network from an administrative system.

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this paper.

IBM Redbooks

For information about ordering these publications, see “How to get Redbooks” on page 142. Note that some of the documents referenced here may be available in softcopy only.

- *Deployment Guide Series: Tivoli Provisioning Manager for OS Deployment V5.1*, SG24-7397
- *Deployment Guide Series: IBM Tivoli Provisioning Manager Version 5.1*, SG24-7261
- *Retail Solutions: Technology Innovation that Matters*, REDP-4087
- *Deploying Linux Systems with Tivoli Provisioning Manager for OS Deployment*, REDP-4323
- *Architecting a Highly Efficient Image Management System with Tivoli Provisioning Manager for OS Deployment*, REDP-4294
- *Vista Deployment Using Tivoli Provisioning Manager for OS Deployment*, REDP-4295
- *Enabling the On Demand Store with IBM Store Integration Framework*, SG24-6698

Other publications

These publications are also relevant as further information sources:

- *IBM Tivoli Provisioning Manager for OS Deployment, User’s guide,* SC32-2582
- *IBM Tivoli Provisioning Manager for OS Deployment, Developer’s guide,* SC23-6137

These product manuals can be downloaded from the Tivoli Library at

`http://www.ibm.com/software/tivoli/library`

Online resources

These Web sites are also relevant as further information sources:

- IBM Point-of-sale and self-service offerings

  http://www.ibm.com/products/retail/products/pos
- IBM Retail Store Solutions Support

  http://www2.clearlake.ibm.com/store/support
- Retail Store Solutions Technical Software Support

  http://techsupport.services.ibm.com/retail/support
- IBM Retail Environment for SUSE Linux, IRES

  http://www-03.ibm.com/products/retail/products/software/ires
- Microsoft Deployment Tools for Windows XP

  http://www.microsoft.com/downloads/details.aspx?familyid=3E90DC91-AC56-4665-949B-BEDA3080E0F6&displaylang=en

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Tivoli Provisioning Manager for OS Deployment in a Retail Environment

Redpaper™

Retail environments, like many other industries, are continously seeking ways to reduce costs and improve their competitive advantages.

One area where cost reduction is at play is with the IT deployed in the warehouses. Because this environment is so distributed, significant cost savings can be achieved if the hardware and software can be maintained without having to be physically present in the warehouse.

This IBM® Redpaper presents the IBM Tivoli Provisioning Manager for OS Deployment software product as a solution to help customers reduce costs for deploying operating systems to point-of-sale devices in a highly distributed environment.

Additionally, the Redpaper introduces a solution specifically developed for IBM Technical Support, to reduce the recovery time whenever a software or hardware failure requires a system to be re-deployed.

The audience of the Redpaper are IT managers in the retail sector and technical support people in areas with point-of-sale or kiosk systems. Technical support people in other highly distributed environments may also benefit from the information herein.

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